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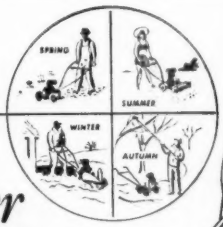

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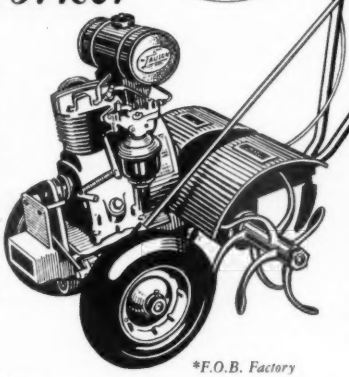

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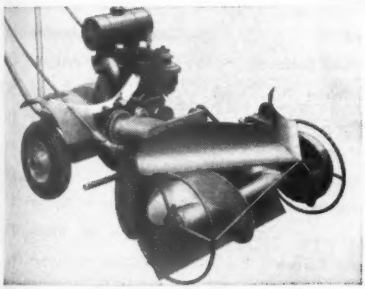

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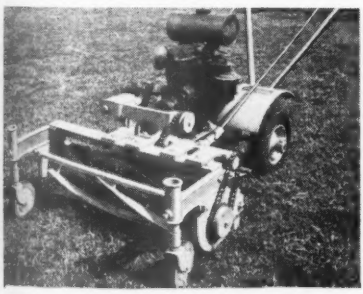

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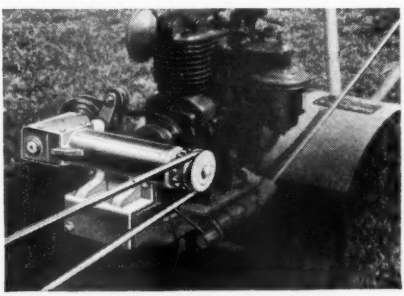

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ORGANI-CULTURE

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PINE NEEDLE MULCH FOR STRAWBERRIES

September 20, 1948.

Gentlemen:

Our place is under irrigation, that is in a district where everyone irrigates from the ditch. Last fall, we plowed under a strip of Ladino Clover. This lay all winter. Then this spring this strip was worked up and set to Gem everbearing strawberries. After the plants had gotten a good start, I began hauling in pine and fir needles. We are located in the mountains with plenty of timber all around. These needles are layered under the timber in places up to six inches in depth. You just scoop them up like manure. We covered the whole strawberry bed of close to 1000 plants with needles to a 3 or 4 inch depth just leaving the plants showing. Presto, no more cultivating for the season, hardly any weed pulling and less than half the watering required in the patch which we didn't mulch. I haven't told you the best part, the plants are yielding twice as many berries as those that aren't mulched and at this writing Sept. 20, are loaded with the heaviest crop of green berries and blooms that have been all season. The flavor and size is excellent. No irrigation ditches to dig between rows, the water spreads itself uniformly under the plants. The berries are held off the ground by the mulch so do not rot near so easily.

Henry Johnson, Jr.,
Rt. 1, Box 272,
Ashland, Oregon.

—o—

PRIZE WINNING ORGANIC FARMER

September 15, 1948.

Dear Sirs:

It may interest you to know that 1948 is our third planting season at Bonis Farm where we have attempted to try out the organic method.

I submitted 10 vegetables and fruit

LIFE SUBSCRIPTIONS

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J. I. Rodale

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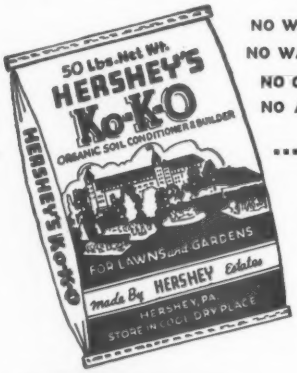

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specimens for exhibit at the Flemington Fair. I won 5 prizes; 2 firsts, 1 second and 2 thirds. It is especially satisfactory to get these in competition with people who spray heavily for clean specimens. The future remains to be seen as I have been told that the pests will multiply and diseases appear in the next years. But this is certainly a good start.

Anne Landsman,
Califon, New Jersey

—o—

MAKE YOUR OWN FERTILIZER

September 23, 1948.

Sirs:

May I tell you of my experience with organic methods even before I read your valued magazine?

Only a fool lives and doesn't learn. Though I know some things I'm woefully ignorant, so I seldom pick up your magazine that I don't learn something.

I had a small lot that for a few years grew fairly good vegetables, but I followed the local paper's garden advice and scrupulously cleaned up and burned every vestige of vines, leaves, etc. so pretty soon the ground was cold and unresponsive. In the Spring green moss covered it, and the vegetables were small, tasteless and full of bugs.

I asked the local nurseryman for advice and he sold me a lot of stuff along with peat moss to make the ground more absorbent. Peat moss is very expensive and I just couldn't see the difference between it and the good stalks that I burned every year, so I decided to dig trenches and bury the stalks and other trash.

Every year, I'd replace the top soil with live earth from the center of the garden. My reward came when passers-by would stop and tell me I had a lovely garden. It was about that time I met Organic Gardening Magazine. I agreed with a lot of things it said and learned more. Since then we moved to the country and the ground is the awfulest ever. It bakes and there are two inch cracks all summer. It will hardly grow weeds and I lost

Books that will help you make a profit in farming

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several plantings of trees, but last spring I put Organic Gardening to the crucial test. I planted 8 peach trees about two feet tall. Just dug a hole and stuck them in the ground, put two shovels of humus in, covered it, put two pails of manure on top and covered it with a hundred pound sack of sawdust about 4 feet in circumference and put blocks on the outer edge, having no rocks. The trees are still growing and are about four feet high, green and lovely; while the untreated ones stopped growing early in summer and look dead.

I fed the asparagus in midsummer and it started growing as if it were spring. The raspberries were just small twigs. After feeding with compost, the plants became huge.

A. Joseph,
34735 W. 8 Mile,
Farmington, Michigan.

—o—

COMPOSTED TOMATOES AND NO BLIGHT

September 30, 1948.

Dear Sir:

I have been growing tomatoes on a small city plot for the last eight years. In spite of faithful application of chemical fertilizers, they deteriorated in quality little by little each succeeding year. Five years ago for the first time I noticed that several plants wilted and became stringy-looking almost over night. "Tomato blight", someone said. "Nothing to be done once it's there but pull up the infected plants."

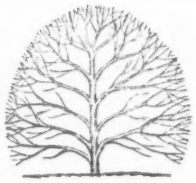
I did this, and to save the rest of the plants I invested in some garden dust for fighting off tomato blight. Yet each year the blight was worse. Two years ago, when I lost every one of my plants from blight, I was fighting mad. But I also began to realize that somewhere along the line I was to blame.

It is autumn now. I grew tomato plants this year that held their own against disease. Not *one* had blight, and the fruit is of better size and flavor. I used no tomato dust at all. If I need any more proof of the values

THE PRUNING BOOK

by GUSTAV L. WITTROCK

Custodian of the Herbarium, New York Botanical Garden.



THE pruning book was written especially for the home owner and orchardist who wants to get the most out of his vines, shrubs, and trees. It is so clearly written and so well illustrated that anyone can maintain a beautiful homestead and a productive orchard with confidence and with the satisfaction that attends beauty in ornamental plants and productiveness in fruit trees. A well pruned tree is also usually a healthy one. The author shares his personal experiences with all who want to do their own pruning. He tells his readers not only HOW to prune, but WHEN to prune. It deals with evergreens, hedges, brambles, ornamental trees and shrubs, fruit trees and shrubs; and gives specific directions for pruning practically every woody plant that is included in a home planting. Cloth bound, 166 pages. **$3.00**

FARMERS OF FORTY CENTURIES

by F. H. KING, D.Sc.

formerly Professor of Agricultural Physics, University of Wisconsin; and Chief of Division of Soil Management, U. S. Dept. of Agriculture

Preface by DR. LIBERTY HYDE BAILEY

AN agriculture is permanent only to the extent that we return to the soil sufficient organic matter to maintain the soil in a living condition; for only a living soil can be permanent and productive. Dr. King takes his readers into the fields of Japan and China to observe at first hand the agricultural practices which enabled those peoples to maintain their soils in a highly productive condition over the centuries. They convert all plant and animal residues into compost as food for the soil organisms. There is neither erosion nor depletion of soils, neither deficiency nor biological diseases of any consequence in their crop plants, and no "running out" of crop plants. In this book we may find answers to our own agricultural problems. Cloth. 384 pp., 209 illustrations from photographs. **$5.00**

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THE forest and woodland have much to teach us in such fundamental aspects of agriculture as maintaining the soil in a living condition, mixed plantings, the inter-relationships of plants which occupy a common environment, and a balanced relationship between plants and animals. This book deals with the most fundamental but little understood relationship between the lowly toadstools which grow in the forest floor and the giant trees which tower high over the other woodland plants. Most interesting of all is the symbiotic relationship between the toadstool mycelium and the roots of great trees, a relationship known as mycorrhiza. This partnership is beneficial to both toadstool and tree, and appears to be of the most fundamental importance in the nutrition of many of our woodland trees. Cloth, 122 pp., 18 full-page illus. from photographs. **$2.50**

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of compost, I have only to look into my neighbor's yard, where, in spite of his dependence on manure applications, one-third of his tomatoes are blighted. He has never pulled them out; yet my plants have escaped entirely. And I give the credit to compost.

Mrs. M. W. Holgerson,
2032 N. 58th Street,
Milwaukee 8, Wisconsin.

—o—

GARDENING WITHOUT ARTIFICIAL FERTILIZERS AND WITHOUT PESTS

June 24, 1948.

Gentlemen:

My tentative efforts at organic gardening are producing gratifying results. There are no pests in the garden at all and the apples are less wormy than last year when I sprayed. I hope that refraining from sprays and by using compost another year or two will produce good apples. The more I sprayed the worse they got.

Many years ago at a place where no spray had ever been used nor any chemical fertilizer and where top soil had been drawn in to a depth of one to three feet, angleworms would come up on a hot moist night until the surface of the lawn seemed to be fairly crawling. I have healthy looking worms here, but not in any large quantity. At that place I could pick up two or three gallons of large worms in an evening but did not know anything about earthworm farming then (and don't know much now).

J. L. Cleaver,
Avon, New York.

—o—

PERFECT APPLES WITHOUT SPRAYING

August 30, 1948.

Dear Sirs:

I set out an apple orchard three years ago and I have a lot of apples this year and no worms in any of them. I tell people that compost did it. My son brought a Mr. Wilson here a few days ago to see my trees. He was

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very much surprised that I could raise apples without spraying. He asked permission to bring his son to see my trees. Mr. Wilson was a nursery man about 30 years ago. He came back a few days later with his son. He said that if I could keep the worms out another year that he thought I would never be troubled with them.

Some of the limbs on the trees are lined up with apples for 15" or more so thick they push some of them off. They have not room to grow they are so thick. Next year I expect to have a very large crop.

B. A. Mathewson,
Rt. No. 1, Box 347,
Orosi, California.

—o—

COMPOST RESTORES DISEASED GLADIOLUS CORMS

October 7, 1948.

Gentlemen:

I wish to add my story to the "glad" symposium in the last issue of the magazine. This I had planned to write you earlier and was therefore particularly interested in the experiments and pictures. Two years ago I bought a collection of gladioli from one of our best known nurseries; a gardening friend bought at the same time. Both lots of corms looked terrible. She returned hers asking for healthy ones and was given a smaller number—but just as bad—in return. These she threw away. I did not know her experience at the time. I looked at the corms I had received, decided that so famous a grower wouldn't send out anything as bad as these looked, and so planted them. But they *were* that bad! I did not get one healthy flower; however, I fed them compost all summer and harvested as usual in the fall. What was my surprise and delight to discover that the new corms that had formed were clean and perfect. I realize, however, that this year's growing would be the pay-off. They were planted in good composted soil, grew well, and produced perfectly good nonthrippy blossoms. I wish I had taken my friend's bulbs that she threw away

and treated them! I think restoring such badly diseased corms by the compost method is even more valuable than if I had just had good flowers from good stock to begin with.

Margaret F. Hastings,
11 Pine Street,
Tenafly, New Jersey.

—o—

IT'S ALMOST UNBELIEVABLE

October 3, 1948.

Dear Sirs:

I am gardening with the organic method, and need not tell you of the results. You know. I will say that after gardening the old way, the results are almost unbelievable. I am so enthused with the idea that it is almost a constant subject of conversation in my house. It is surprising how few people are interested in gardening, much less using a good system. Especially down here in South Jersey, "The Garden State".

J. I. Brown,
Cape May, N. J.

Legal Aid Society

Our attention has been called to a number of situations in the practice of the organic method of gardening that require legal interpretations. For example, can an agent of the State or Federal Government compel a gardener to use poisonous sprays on his food or ornamental plants to kill insects? Or, has a representative of a Board of Health the authority to prevent a citizen from building a compost heap in connection with making organic fertilizer for his garden? We suggest that all attorneys who are readers of Organic Gardening magazine and who believe in the natural methods of the organiculturists organize themselves into a Legal Aid Society. To join this society, we invite you to send your name and address to Organic Gardening, Emmaus, Pa.

Is the Universal Intelligence Wrong?

If you believe in a Universal Intelligence, then you must believe in it's ways. When you say that you can improve on Nature, you are claiming to be smarter than the Universal Intelligence, for Nature's ways are the ways of Universal Intelligence. Feeding the soil and plants with artificials is claimed to be an improvement on Nature, but Nature's way is the Organic Way, and that is the Universal Intelligence's way. K-K Super-compost being made up 100% of numerous organic matters is Nature's way of feeding the soil and plants, and it is Universal Intelligence's way. The same is true of K-K small earthworms.

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A TRIP TO ALABAMA

I HAVE just returned from a visit to Alabama the details of which are perhaps worthwhile recounting. The trip was sponsored by D. E. Ponder, owner of the Yarn-a-bout worm farm of Opelika, Alabama, who has been raising earthworms for twenty years and whose method appears to be radically different from that of Dr. Oliver, the basis of which is to have the earthworms work in a medium or mixture of one-third soil, one-third green matter and one-third manure. Mr. Ponder has evolved a process in which the earthworms work in a medium of finely ground up green matter, exclusively, which he calls the earthworm food, with absolutely no manure or other animal matter being present.

The only draw-back is that one must purchase this food from Mr. Ponder at 7½c per pound and it is a costly method if one is going to follow it to merely produce compost, for these earthworms turn out an excellent compost. But where it is employed to propagate worms for fishermen, and only incidentally getting an extra dividend of the residual compost which results, then the plan is most economical. One hundred pounds of finished compost can be purchased today for about three or four dollars wherever it is available, but one hundred pounds of the Ponder earthworm food, before even being processed by the worms, costs $7.50.

I was very much impressed with the health, size and activity of Mr. Ponder's vegetarian earthworms and while there a thought occurred to me which might very well change the method of making compost at the Organic Gardening experimental farms. At first, it appeared to me that the compost turned out by Mr. Ponder's worms, would not be all-sufficient, because no animal matter was present. Sir Albert Howard has said that in the continuing use of compost made from green matter only, there would eventually result a dying out of the plant species, that is, the plants growing on land where such compost is applied, would eventually produce seed that would not have sufficient ability to grow good plants. The farmer would then be faced with the problem of always purchasing his seed from outside sources. Also, the nutritional quality of a plant that would produce sterile seed would then have to be under careful scrutiny.

For this reason we have always been preaching Sir Albert Howard's concept of using three times as much green matter as manure in making compost because in studying plants growing in the fields and forests Sir Albert found three times as much plant matter as

manure, the latter consisting of the dead bodies of insects and animals in the soil, their droppings and that of birds, etc. etc. So I said to Mr. Ponder, "The only drawback I see with your compost is that it is made without manure, although it looks nice and black."

Mr. Ponder, a tall handsome Southerner looked me over with a little irritated gleam in his eyes and in a delightful Southern accent answered: "Mr. Rodale, what do you think the castings of the earthworms are?"

Well, the force of his answer hit me like a ton of bricks. The castings of earthworms are the finest manure you can get and I ran my fingers through his earthworm beds and noted the rich content of castings. Right then and there I decided that I would never call earthworm castings—*castings* any more. From now on I shall call it manure, for what else is it? In experiments made at the Connecticut Agricultural Experiment Station it was discovered that the manure ejected by earthworms was 33% richer in nitrogen; 32% richer in phosphorus and 35% richer in potassium than the soil in which the earthworms lived.

When we made a change in the Sir Albert Howard method of making compost a few years ago, by inserting earthworms in the pit about six weeks after the materials were assembled, and after the heat of fermentation had subsided, Sir Albert applauded. He reprinted my article explaining this change in his journal. My primary purpose was to eliminate the two turnings of the material. Let the earthworms do it. Today, I find that by this method we are turning out a much finer compost. Now, since we see that by this method the earthworms are charging the material with a large amount of manure extremely rich, not only with nitrogen, phosphorus and potash, but also with other valuable minerals, we can come to the conclusion, that if we can find a way to break down green matter alone with the aid of earthworms, we can eliminate the need of getting animal manure for compost-making. Many persons seem to find a difficulty in securing manure. Also it would be extremely convenient for vegetarians who do not wish to farm with cattle. In other words they can use earthworms as their cattle.

I told Mr. Ponder, frankly, that he had shown me a new light. I began to examine his process further and found that he uses no soil or lime. As soon as I returned home we immediately got busy and began an experiment in making compost using green matter only, without soil or lime. Mr. Ponder claims that lime hinders his earthworms. Such things as lime and phosphate rock where necessary can be applied directly to the soil. In our current experiments we have filled the ten small pits near our stone vegetable garden with green matter assembled under various conditions. Some of the pits contain finely ground matter, others, materials of various degrees of coarseness. Some are treated with finished compost strewn between layers of green matter so as to inoculate the green matter with bacteria. One of the pits was treated with the Earp-Thomas type of bacteria which can be purchased from advertisers in Organic Gardening. Some of the pits were soaked with a solution made of Curbay, a by-product obtained from molasses which is a good food for bacteria. Perhaps a new process is in the making.

After about six weeks large amounts of earthworms will be placed in the pits to do their part in breaking down the green matter. Mr. Ponder claims that his compost, without the aid of lime, comes out practically neutral, with a Ph of about 7. This aspect will be checked carefully. The results of what goes on in these seven pits will be reported on in this magazine probably in the late spring or early summer of 1949. I am sure that were Sir Albert alive today he would strongly advocate such experimental work. It does not matter whether the manure comes from steers, cows or earthworms, so long as it is animal matter. No matter how the process is changed,

in essence it will be based on the original ideas of Sir Albert Howard.

Mr. Ponder showed me his vegetable garden close to his out-door earthworm beds. For two years he has been applying his residual compost in this garden which is a pleasure to see. Beans, without sprays or other chemicals, were immune to the Mexican Bean Beetle. I had the pleasure of seeing the reaction of many local visitors to that garden, in comparing it with their own efforts.

I trust that by the time this new green matter-earthworm compost is ready our Soil and Health Foundation laboratory will be in a position to examine it carefully from a chemical and bacteriological point of view and some interesting findings may result.

J. I. RODALE.

(EDITOR'S NOTE: My subject for next month will be—*"The Menace of Artificial Insemination of Cattle."*)

Tractors Are Increasing Danger of Soil Abuse

The change from horses to tractors on American farms has increased the danger of soil abuse.

This is the conclusion of three soil scientists of the U. S. Soil Conservation Service at Cornell University who have completed a study of the effects of organic matter and erosion on soil packing in New York State.

A soil low in organic matters when subjected to the compacting force equal to the rubber tire of a two-plow tractor, may pack to a point that water will move through the soil very slowly, Dr. John Lamb, Jr., said. *On the other hand,* organic matter protects the subsoil against compaction. The amount of organic matter and intensity of the packing force help determine the amount of moisture a soil can hold.

The packing force used in the soil tests was equal to a tractor or empty truck.

Among the results: For each of the soils studied, the sample with the highest degree of packing was lowest in organic matter.

"With more and more heavy equipment coming onto our farmlands today, we need to be more concerned than ever about maintaining a high organic-matter content in the soil," Dr. Lamb advised.

Science News Letter, September 25, 1948

PROTECT BIRDS

By DR. EHRENFRIED E. PFEIFFER

THIS month, the writer will break his routine of reporting on soils and health and present a plea for bird protection. The following report Chicago Daily Tribune, July 12, 1948. (Special) from Greenwich, Conn. (1) which has been running in the daily press recently really obliges him to do this:

"Officials of the National Audubon society's Greenwich nature center here, whose more than 400 acres abound with wild life, are concerned over the death of many birds, apparently from eating insects killed by insecticides. The center has begun extensive tests to determine the percentage of concentration of insecticides that may be used safely out of doors without injuring birds and other animals . . .

"Charles E. Mohr, director of the center, said that in the last week he had received messages from several towns in Connecticut that large numbers of dead birds had been found, killed apparently by eating insects that had been poisoned . . .

"The National Audubon society's headquarters in New York City has recently received word from Morristown, N. J., on the same subject. One letter told of a large group of birds, all found dying of convulsions at the same time. A Morristown postman also wrote to say he had seen a considerable number of birds fall dead to the ground after some trees were sprayed.

"'Apart from the fact that a lot of people enjoy birds, the serious point is that birds are the best of all insect destroyers,' Mohr said. 'Moreover, hundreds of species of valuable insects, such as bees, are likewise killed by those poisons . . .'

"Mohr emphasized that the Audubon society took no position for or against the use of insecticides and that 'it is entirely too soon in the experiments for anyone to assert that the new insecticides are "too dangerous" to use out of doors.' He suggested, however, that no insecticides be used during the nesting season of May, June, and early July. In that period, he pointed out, two years' brood of birds could be killed at once."

Another and even more vital reason for our concern for the birds is that they are a part of the living balance of nature. Once this balance is distorted, there is no visible end of the consequences in the general household of animal and plant life, among the healthy as well as the diseased.

Then, too, not only are birds "the best of all insect destroyers", but they are the most harmless. A few figures may illustrate their importance as exterminators. One young European cuckoo, frequently looked down on as an intruder in the foster parents' nest, devours about 800 caterpillars a day. And the foster parents are really able to provide these great quantities. His American cousins, the Yellow- and Black-billed cuckoos are also great eaters of tent caterpillars and inchworms and also have the very satisfactory habit of killing a great many more of these pests than they are able to eat.

One pair with three young of any of the members of the Family Paridae, which includes nuthatches, titmice and chickadees, wipes out over 80 lbs. of insects during a summer. An orchardist informed us that a few pairs of titmice with their young can take care of the entire caterpillar and flying insect

population of a one acre apple orchard. Then consider the capacity of the swallow. A pair of swallows collect about 10 flies 20 times per hour for their nestlings. Every day, this amounts to about 7000 flies per family. Per summer, this is more than half a million insects. In the average old-fashioned barn one could count as many as ten or twenty families of these masters of aerodynamics. That was before the DDT age. Now, swallows are disappearing from the cow barn.

How can we aid and abet these natural helpers of ours? One of the most important steps is to provide them with nesting facilities, with food and water in the wintertime, and beyond that to let them live in "peace", in their own way.

Swallows are best attracted by putting nesting boards (4" by 3") underneath the ceiling in barns, haylofts, and open sheds, or below an overhanging roof. They can even build a nest on a pair of long nails, projecting at least 4" from the wall and spaced 3" apart. If you live in a region of light sandy soil, it is a good idea to have a box of a clay and cow manure mixture at hand (should we say "at beak") for the swallows' building material supply. This should be kept quite moist. Up to 30 swallows have been seen making use of such a box, all at the same time.

All the members of the titmouse family prefer to nest in hollow trees, sometimes taking over the old homes their close cousins the nuthatches have prepared in former years. If there aren't any of these vacant, the chickadee will cheerfully set up housekeeping in a knot-hole, a hole in a stonewall, or a hollow fence-rail. Incidentally, an authority on insect life has calculated that a chickadee is beyond comparison as an enemy of the female canker-worm moths and their eggs, destroying about 5,500 eggs in one day. So one can see that it is truly worthwhile encouraging them in their protection of our deciduous trees against the inroads of these pests. And one can attract them by hanging nest houses for them. Alas, the fantasy of the artist-carpenter who has designed these, often counteracts his good intentions. Frequently, one sees the titmice evicted or not even permitted to step foot over the threshold by the sparrows who have taken over these modern hostels. This sort of thing can be avoided by making the entrance small enough for the titmice and not quite big enough for sparrows. Depending on the size of the opening and the size and shape of the inside space you can get one or another kind of bird to make use of these houses. Entrances 1 1/16" in diameter are sparrow-proof and yet large enough for the smaller species of titmice. This size would be best where competition with sparrows is strong, otherwise a slightly larger opening is recommended. One and a quarter inch openings appeal to the larger members of the titmouse group; starlings, downy woodpeckers and small robins need 1 13/16" holes. The hairy woodpecker and the flicker must have 2 6/16" entrances. These larger birds can and will defend themselves against the encroaching sparrows. Falcons, nighthawks and the smaller owls need 3 1/2" holes. Have the entrance hall-way roomy enough so that the bird can move and turn in it. Its inner diameter should widen out to three inches for the two smallest types, and to three and three-quarter inches for the larger. The inner chamber proper should widen out gradually to four inches for the smaller and four and three-quarter inches for the larger bird houses. The inner depth, from the entrance hole to the floor should be 6 inches for the two smaller houses, nine inches for the medium, and twelve inches for the largest size. To allow for headroom in the apartment the opening should be located 2 1/2" below the removable cover of the birdhouse.

It is important that these houses be cleaned in the autumn to avoid a carry-over of diseases and vermin. Removable covers are therefore preferable. There could also be a small

hole bored at the bottom for ventilation and drainage. The houses should be hung in the perpendicular on trees, or poles. Slant the cover down and out so that the rain will run off. Sometimes the tree on which you want to hang the box grows so that you can't place it straight up and down as advised above. In any case, never have the lower end sticking out, it doesn't matter if the upper end is a bit out from the perpendicular. It is best to have the entrance in the side, rather than in the front. A little dry peat moss on the floor is looked on with favor by most of the birds. They also prefer to find these homes in groves or trees and other quiet places.

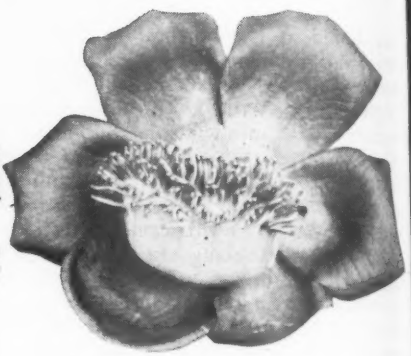
Having "solved" the housing problem, the next question is that of winter feeding. Helpful as this is, it is better not to do it at all than to do it wrong. Feeding stations or shelters should be well protected with large overhanging roofs, and have easily accessible platforms underneath. The food should not be exposed to snow or rain. Remove moldy, wet, or decaying material. It is good to have feeding tables on two levels, one about five feet above ground and a smaller one two feet below it, to attract the birds. Feeding boxes hanging on a wall may serve. These should have slanting roofs. Bags, wire baskets, or open feeding vessels exposed to rain and snow, which let the feed freeze or rot are detrimental to the health of the birds one wants to protect. No matter how and what you feed, guard against moisture. If the feeding stations are placed among small trees or shrubs, sheltered against wind, then they will not fail to serve their purpose. Do not forget, in addition to the grain or seed mixtures which you feed, to include some suet. When the snow covers the ground or the little birds are shivering with the cold, it is too late to set up the feeding platforms. By that time they will be confused and weakened, and will distrust rather than accept the new gadget. Place your feeding equipment in November, before winter comes, so that the birds get used to it and know where to go in an emergency. There is no danger of overfeeding them, for our little friends always prefer their natural hunting grounds; with the first thaw they disappear from the platforms. To call the birds' attention to their tavern one can scatter a little feed on the open ground nearby and discontinue this practice as soon as they have accepted the feeding stations. These are best located near the nesting houses, if you also have these.

In a forest or wild life preserve it is sufficient to have one large feeding station for every 400 to 700 acres. The good news will spread fast.

For nature lovers we recommend an attractive experiment with a "feeding tree." One mixes several ingredients for such a "tree", the following, for instance: 4 ounces of dried ground bread, four ounces of meat scraps, 8 ounces of hemp seed (whole), 4 ounces of crushed hemp seed, 4 ounces of poppy seed, 2 ounces of oats, 3 ounces of dried elderberries, 3 ounces of sunflower seed, 3 ounces of ant larvae (eggs). These are all then stirred into 2 1/2 lbs. of melted tallow. When it has cooled and hardened, you can store it in this cake form. Melt a small amount at a time and pour it over the twigs and needles of one of the smaller low-growing conifers (fir, spruce). Start at the tips of the branches and pour so as to cover the needles and fill the spaces between them. The mixture will harden and stick if you get it just right. You will be surprised to see the varieties of birds which will frequent such a tree. This plan will work particularly well in a period of dry cold, less effectively when the trees get covered with snow or ice. After snowfalls, go out to the tree and gently shake the snow off. About every two or three weeks you will have to add more of the mixture to the tree because the birds will have eaten it up.

The provision of various sorts of bird feeding facilities makes an excellent field project for school children in connection with biology and nature studies.

The Cannon-Ball Tree



By ALEX D. HAWKES
New York Botanical Garden

Of the thousands of species of trees which are grown in tropical countries for ornamental purposes we find a chosen number which are exceptional for some especial reason. These trees may be grown for their edible qualities or for the fiber which they produce, or perhaps for their fruits or the beauty of their flowers.

Few trees which are cultivated for the last reasons are as intriguing to the plant enthusiast as is the fabled Cannon-Ball Tree of South America. This exotic plant has been known to the botanical world since the time of Jean Aublet in 1775, when it was first described in his *Histoire des Plantes de la Guiane Francoise,* but it is uncommon in cultivation and not as widely known as it might be.

In the years following Aublet's original description, it has been discovered over a large area in South America, in the region encompassing the Guianas and portions of northern Brazil. It is known by the botanists as *Couroupita guianensis,* Aublet's generic name being derived from the native vernacular, *couroupitoutoumou.* The genus to which it belongs is a small one which has long caused trouble for the taxonomists, they being unable to decide exactly where to put it in the plant kingdom. The group now seems best placed in the Brazil-Nut Family (Lecythidaceae), though it is not too closely allied to any other genus there.

The Cannon-Ball is a hugh tree, attaining as much as a hundred feet in height in its native jungles, where it raises its foliage above most of its neighbors. It typically has a widely spreading crown of rather rough branches, from which the leaves fall—generally in March—for a few days, only to be rapidly replaced by the new ones. These leaves sometimes attain a length of almost a foot and may be as much as four inches across.

The flowers are produced on woody stalks which emerge from the trunk or principal limbs of the tree, these stalks elongating year after year and sometimes becoming three feet or more long. Though a hundred blossoms may be found on each of these inflorescences, only one or two fruits will form, and often these do not reach maturity, but rot and fall off at an early age.

These flowers are about four inches in diameter, furnished with a delightful spicy fragrance, and are of a spectacular color combination. The thick petals are a rich wine-red, often shaded with magenta toward the base, and the central tuft of papillae-like stamens are suffused with dark pink and pale lilac. These petals are a dull yellowish-white on their outer surface, and the entire blossom is of very fleshy texture. In the center of the flower is

a thick callus-like growth with a very roughened surface, and of a whitish hue, often suffused irregularly with yellow.

After the flowers fade and fall, the fruits commence to grow, and in a short time assume the characteristic globular shape which gives the tree its common name of "Cannon-Ball." These fruits are rather slow in ripening, and when mature are about six or eight inches in diameter and covered with a very hard rust-colored shell. They are often cut in half and the resultant sections utilized by the natives as drinking cups, cooking vessels, or storage containers. Inside this hard shell lies a fibrous pulp—greenish-white in color, but turning blue when exposed to the air—containing many flat circular seeds, a substance which is occasionally employed as a refreshing potion in fever treatments. This pulp, however, is possessed of a very powerful stench which persists long after the shells are cleaned of all particles of it, and one can scarcely imagine enjoying a draught of a liquid concocted from anything smelling so badly. In addition to its medicinal utilization, this foetid meat is sometimes used as a depilatory by the Indians who inhabit the primitive areas where the tree is indigenous.

The great hard fruits, when falling to the ground, make a loud noise which has been likened to that of a fusillade of cannon. The unwary walker beneath the *Couroupita* tree had thus best beware of falling fruits, or a cracked skull will be the result of his carelessness.

Though a decidedly tropical tree, the Cannon-Ball is successfully cultivated in this country, principally in southern Florida, where it thrives and several excellent specimens are to be found.

Cannon-Ball tree with fruit

It is a strange plant, with its large showy flowers and great rock-like fruits with their horrible odor, and its unusual method of flowering always attracts the passing eye.

This species furnishes another excellent example of the fascinating variety which is to be found in the plants of the tropics, where Nature has almost outdone herself in many instances. The Cannon-Ball Tree may certainly be numbered among the most amazing members of the vegetable kingdom.

Arrangement of Plants

In the rock garden the arrangement of the plants should be in clumps or colonies of one variety, and not of a mixed planting where the strongest growing kinds can overrun the weaker, many of which would perish under these conditions.

THE HIDDEN WORLD

By LEONARD WICKENDEN

DISMAYED as we may well be by the frequent outcropping of new diseases and by the refusal of old diseases to surrender to the attack of the spray-gun, it is reassuring to find that, year by year, hope is growing stronger that a much more effective attack can be made through the soil. Nevertheless, anyone with an enquiring mind must find himself wishing for an explanation of the phenomena which are reported in such volume from all parts of the world.

Why should the addition of organic matter to soils enable plants to resist disease? Is there any scientific reason for the results obtained? Or must we base our hopes on blind faith?

To obtain an answer to these questions it is necessary to consider some of the discoveries which have been made in recent years by bio-chemists, and, before we can appreciate their significance to the farmer and gardener, we must form in our minds a clear picture of just what this substance is that we speak of as soil.

What, then, is soil? I suppose the biggest surprise to most people is the discovery that normal soil is nearly all mineral matter. There are plenty of fertile soils which contain no more than 4% organic matter; 10% is a high figure. The balance is made up of sand, and clay, and a mixture of compounds of iron, lime, potash, and other minerals. (For the sake of simplicity, we are speaking of the solid constituents only and are ignoring air and water, each of which is an important constituent of soil, as every good gardener well knows.)

Since so much of the soil is mineral, it is natural that the question should arise as to whether the mineral constituents should not be our chief concern. The answer is a very emphatic no. Small though the proportion of organic matter is, its importance is supreme. Soil without organic matter becomes a desert. Since the claims for organiculture are based on the presence of this relatively small percentage of matter, it is worthwhile to give it some close study.

Suppose we go into your garden and take up between our thumb and fingers a little of your soil—say about as much as we could hold on a nickel. What do we have? Is it just a small quantity of inert matter—dirt, as so many people blasphemously call it? By no means. It swarms with life. So dense is its population that New York City, by comparison seems like a deserted village. The living organisms in that tiny quantity of earth far outnumber the human population of the whole of the United States. The organic matter is the habitat of that teeming life.

The soil is a world of ceaseless activity—a world which almost all of us ignore most of the time, and one which many of us do not even know exists. In a way that fills a man with wonder, it bears many resemblances to the world we see and know. There are in it (according to human standards) good and evil, peace and war, cooperation and enmity. Some organisms, visible to human eyes only through high-powered microscopes, are perpetually fighting and preying on other organisms; some groups live at peace with others and even form alliances for their own mutual benefit.

Some of these microscopical crea-

tures are so important to man that, without them, he would have no food, no clothing, no wood to build his houses, and the world would become uninhabitable. Others are (or, with our limited vision, seem to be) our worst enemies; they bring disease to man, to his crops, to his flocks and herds.

Some of the organisms in the soil are animals; some are vegetables. In size, they range from relative monsters like earthworms and beetles to organisms so small that they are invisible even under an ordinary microscope. Except when weather conditions slow down their activities, all of them are tremendously busy—helping man or harming him, but affecting his life so constantly and to so high a degree that the last thing we can afford to do is ignore them.

While insects and earthworms have their functions, and important ones at that, it is the microscopic forms of life that have so much to do with health and disease of plants. There are two main types of these microscopic organisms; one type feeds on decaying matter, or matter that has no life; the other, on living organisms. The first type is called saprophytic—a word which signifies a plant living on decaying matter; the second is called parasitic, which means "depending on host organisms for survival. Some parasites cause diseases and are called pathogenes". Examples of the first are the organisms which bring about decomposition of vegetable and animal matter in a compost heap, or the rotting of wood, or the moulding of food. Examples of the second are bacteria which cause disease in animals and plants. The war in the soil is, to a large degree, between organisms of these two types.

Dr. Selman A. Waksman, the discoverer of streptomycin and other antibiotics, in his book *Microbial Antagonisms and Antibiotic Substances* (The Commonwealth Fund) writes of this never-ending battle of the microbes. He points out that since animals and plants have existed on this planet for millions of years, the number of disease-producing microbes which have found their way to the soil must be beyond surmise. Through countless ages, human and animal excrement has been deposited in or on the soil. Corpses, human and animal, have been buried in it, many of them undoubtedly swarming with disease bacteria. Plants, dying of all kinds of diseases, have deposited their remains on the earth. If the bacteria from all this death and corruption had survived, the whole world, by now, would be a festering and foul horror. What, Dr. Waksman asks, has become of them?

Almost a hundred years ago, Walt Whitman asked the same question in his poem *This Compost.* He wrote:

"Behold this compost! behold it well!
Perhaps every mite has once form'd part of a sick person—yet behold!
The grass of spring covers the prairies,
The bean bursts noiselessly through the mould in the garden,
The delicate spear of the onion pierces upward,
The apple-buds cluster together on the apple-branches,
The resurrection of the wheat appears with pale visage out of its graves.
What chemistry!
That the winds are not really infectious,
That all is clean forever and forever,
That the cool drink from the well tastes so good,
That blackberries are so flavorous and juicy,
That the fruits of the apple-orchard and the orange-orchard, that melons, grapes, peaches, plums, will none of them poison me,
That when I recline on the grass I do not catch any disease
Now I am terrified at the Earth, it is that calm and patient,
It grows such sweet things out of such corruptions,

It turns harmless and stainless on its axis, with such endless succession of diseased corpses,
It distils such exquisite winds out of such infused fetor,
It gives such divine materials to men, and accepts such leavings from them at last."

Had Walt Whitman exclaimed "What bio-chemistry!" he might have ruined his poem, but his prescience would have been even more startling. But the word was not coined when the poem was written and it remained for Dr. Fleming, of penicillin fame, Dr. Waksman and others to explain why the earth turns harmless and stainless on its axis with such endless succession of diseased corpses.

Dr. Waksman tells us that it has been found that disease-producing bacteria (pathogens) do not survive for very long in the soil; they are destroyed through the agency of other organisms. Let the soil be invaded by pathogens, and a defensive army springs to the attack, increases in numbers as it feeds upon its victims, consumes or otherwise destroys them.

He writes of instances in which soil has been inoculated with bacteria from the animal colon. If the soil was first sterilized, the bacteria not only survived but multiplied, but if they were added to fresh soil they rapidly disappeared. Further than this, if later additions of the bacteria were made to the soil, the speed with which they disappeared increased with every addition, indicating that the army of antagonists was growing larger with every fresh invasion of the enemy. Some of these destroyers were isolated and when added to a pure culture of the pathogenic bacteria, they quickly destroyed them.

Such observations as these provide clear evidence that some pathogens disappear from the soil, not because they starve to death or because conditions in the soil are unfavorable to their survival, but because they have been attacked and slaughtered.

The possibilities arising from these discoveries were plainly of great importance to mankind. If there existed in the soil organisms capable of destroying disease-producing bacteria, could not these organisms be used in the fight against human disease?

The idea of using one type of bacterium as an antagonist of another is not new. Seventy years ago, Pasteur, in his famous experiments, inoculated animals with bacteria to protect them from anthrax, and since his time numerous other investigators have followed similar procedures, some, of course, with great success. But the production of antibiotics from microbes (and their use in combating disease) is a recent achievement.

Let us be sure we understand what an antibiotic is. There is a common misconception that an antibiotic is a living organism, just as people can still be found who hold a vague belief that a vitamin is a living organism. In neither case is this correct. Both antibiotics and vitamins are chemical compounds, in exactly the same sense as citric acid, Epsom salts and cream of tartar are chemical compounds. They can be produced, and are produced, as crystals. They have been analyzed, and the composition and structure of many of them are known. Much progress has been made in producing them synthetically. An antibiotic, then, is a chemical substance which originates in a microbe and has the property of preventing the growth and activity of bacteria and other microorganisms.

Many antibiotics have already been isolated and identified and there is every indication that the search has only begun. We can expect to read reports of the discovery of new ones for many years to come. They differ greatly in their properties and characteristics. Only a few of them, so far, give promise of being of value for preventing or curing human diseases; some are highly toxic, some are mildly toxic, while others are almost completely non-toxic—at least, in the proportions necessary to obtain the desired effects. Some check the growth

of bacteria without killing them, others kill them outright, and yet others cause their complete disintegration. On the whole, they are very selective in their action, some being effective against one type of bacterium, some against another.

In the present discussion, we are not especially concerned with the use of antibiotics for the treatment of human diseases, but rather with the larger question as to the main purpose for which they exist. Are we to suppose that the antagonists from which the antibiotics are extracted exist primarily for the curing of human diseases and have been waiting in the soil, for untold centuries, until Dr. Waksman and other geniuses came along and discovered them? Surely not. The mere fact that many of them are toxic to man and other animals disposes of that idea—if anyone ever held it, which I doubt. All through the ages, the antibiotics have been doing their job of keeping the soil healthy, of growing "such sweet things out of such corruptions", and it is a logical assumption that they play an important part in keeping plants free from disease.

Is there any direct evidence of that assumption? Indeed there is. Dr. Waksman devotes a whole chapter of his book to the subject of microbiological control of soil-borne plant diseases. He tells us that many fungi living in the soil are powerful antagonists of other fungi, and of bacteria, which cause disease in plants. He proceeds to cite a number of instances of the destruction of pathogenic organisms by antagonistic microbes. In laboratory experiments, for instance, it was found that when fungi which caused disease in wheat seedlings were cultivated on sterilized soil, their growth was checked when the soil was inoculated with harmless fungi and bacteria. Still more interesting, the same effect was produced by adding to the infected soil a small amount of unsterilized soil, indicating that this fresh soil contained antagonists. In another experiment, the virulence of disease organisms was greatly reduced by the use of penicillium—the mould from which pencillin is extracted.

Dr. Waksman lists so many instances of antagonism between plant pathogens and other soil organisms that it is impossible to give them more than passing mention. The organisms which cause the damping-off of seedlings, or Dutch elm disease, or turnip rot, or citrus canker, or flax blight, or watermelon disease, or potato scab have all been successfully combated by other specific fungi or bacteria or by substances extracted from them. The list could be extended further, but enough has been said to demonstrate what good grounds Dr. Waksman has for writing: "The importance of soil microflora in modifying plant diseases caused by soil-borne pathogens is being realized more and more clearly."

In all of these experiments, you notice, an attempt was made to cure or prevent a disease by inoculating the soil with an antagonist or an antibiotic, but a little later Dr. Waksman makes a statement of extraordinary interest. He tells us that the application to the soil of materials which favor the development of antagonists *has given much more favorable results than the use of pure cultures.* In support of this statement, he gives a long list of results obtained by different workers in the United States and other parts of the world.

He tells us that W. A. Millard, as long ago as 1923, claimed that he had controlled potato scab with green manure, and in 1929 H. Fellows obtained field control of the take-all disease of wheat, in Kansas, by the application of chicken and horse manure mixed with alfalfa and other vegetable matter. S. D. Garrett, in a series of reports during the period 1938 to 1942, reported similar results on the same disease "by periodic additions of organic manures". Van der Poel, in Holland, reported the control of slime diseases of tomatoes by the addition of green manures to the soil before planting. C. J. King, in 1934, found

that the root-rot of cotton, in Arizona, could be prevented by the use of organic manures. In 1941, his results were confirmed in Texas by Mitchell, Adams and Thom, who found that the application of organic matter to the soil resulted in the destruction of the organism causing the disease.

Other workers report success in curing or preventing apple disease, wheat disease, disease of citrus seedlings, and root-rot of watermelons. T. D. Blair, in 1943, found that the addition of 1% of ground wheat straw or dried grass to soil in which radish seedlings were growing checked, to a marked degree, damping-off of the seedlings.

Those who seek further and more detailed information can find it in Dr. Waksman's book, but surely no-one can read such a list as the above and still assert that there is no scientific basis for organiculture. Apparently somebody can, for somebody has. In the most recent Yearbook of Agriculture, published by the United States Department of Agriculture, Dr. A. G. Norman writes a chapter on Organic Matter in Soils. I quote from it:

> "It has even been asserted that crops grown in soil in which composts have been incorporated are —less susceptible to disease—. No sound scientific evidence is marshalled in support of such claims."

That seems to put Dr. Waksman in his place. But, by a very curious coincidence, the next chapter in the book is written by none other than Dr. Selman A. Waksman. It also strikes me as curious that, although this Yearbook has the title *Science in Farming*, Dr. Waksman's chapter (entitled Soil Organisms and Disease) deals exclusively with soil organisms and human and animal infections. I find mention of cholera, diphtheria, malta fever, tuberculosis and other human and animal diseases, but not one word about potato scab, or turnip rot, or wheat disease, or any of the plagues about which Dr. Waksman wrote so fully two years previously in his own book. It would, perhaps, have been a little embarrassing if one U. S. D. A. expert had flatly contradicted another in an official publication of the Department.

Our Agricultural Experiment Stations are faced with two alternatives. They can follow the road on which they have been travelling for so many years, always seeking the new fungicide which is going to be so much more effective than any hitherto found, but which always seems to be just around the next bend; or they can decide that henceforth they will cooperate with the soil instead of fighting it. If organic manure cured black-root in beets and root-rot in cotton; if compost cured mosaic in South African sugar-cane and kept wheat healthy in Kansas; if green manure controlled scab on potatoes and slime disease in tomato plants; isn't it worth while to find out whether skilfully made compost won't keep potatoes healthy in Connecticut, wheat free from disease in New York State, oranges free from blight in California, and tomatoes resistant to black rot wherever they are grown?

After sixty years of failure, why not stop fussing with spots on the leaves and go to the root of the matter?

An Unfolding Blossom

I often think, when working over my plants, of what Linnaeus once said of the unfolding of a blossom:—"I saw God in His glory passing near me, and bowed my head in worship."

—*John Fiske*

Quick Return Method Succeeds

By EDWIN H. ABRAMS

THE Bruce "Quick Return Method" of compost making may prove to be of much greater importance than anyone suspects. When the results are made known generally there will be a great increase of gardening all over the country. Heretofore the main difficulty has been to secure enough manure. Even when obtainable the cost has often been prohibitive. The last lot bought by the writer cost $5.50 for a cubic yard, and it was consumed in two heaps about four by five feet, and four feet high. As I keep four or five heaps going continuously, this could be a heavy item if no other activator was available. In this, the middle section of Florida, composting can be carried on the year around. Using the Indore method, instead of taking three months to become usable humus, a compost heap is ready to put in the garden in not much more than two months.

Now, with the Bruce method, two important savings can be made. There is no turning of the heap, and the time can be shortened to one month. As to the cost, a few cents for a compost heap is all the activator costs. A package of this in powder form is obtainable in this country for $1 and this treats tons of compost.

From the first reading of the Bruce booklet, with the introduction by the publishers of "Organic Gardening," the method appealed to me, and as soon as the activator arrived a compost heap was started, carrying out as nearly as possible the instructions given in the booklet. The first trial may be a little disappointing in this country, but the method, with slight modifications, should succeed here as well as in England. Bearing in mind the moist climate of England and our drier climate, the compost heap after being made up should be sprinkled sufficiently in dry weather to keep it moist, instead of being covered to keep out rain. My first heap was composed of some rather coarse materials, including dried corn stalks and all kinds of weeds and grass. Started May 19, it was opened June 19, and though the outer part had not completely broken down, the inside had turned to a beautiful humus with the smell of the woods leaf mold. Within a few days the coarser part, treated with the hose, was ready for the garden.

An examination of the heap as it matured showed the need of moisture, and it was sprinkled slightly several times. The result indicated that still more moisture would have been better, and would have broken down more of the outside. This heap was made inside of loose concrete blocks 4 x 8 x 16, forming a box about three by four feet, and two feet high. While on the subject of boxes, a permanent box made of the same size hollow blocks, but laid up with mortar, has proven the most satisfactory of the numerous ones tried. The dimensions are approximately 4 by 5 feet by 4 ft. high inside. Above the first course on the 5 ft. side a 16 inch opening, the width of a 16-inch block, is left. As the box is filled, blocks are added to complete the box. Screened openings in each end of the first course of blocks give ventilation. A 6-inch pipe or rolled chicken wire in the center is the main vent. The contents of this box get no turning, and become excellent compost in three months or less. As this box is being filled with a new charge, an experiment combining the Indore method and the Bruce method will be interesting when completed during the next few weeks.

—Photo by The American Iris Society

Iris Great Lakes in garden of Jesse Wills, Nashville, Tenn.

By

MELVIN G. GEISER,
Beloit, Kansas

American Iris Society Judge

BRUSHINGS OF A RAINBOW

AN artist, to paint a canvas, gathers around him the necessary paraphernalia requisite to his trade. Items he would include are brushes, a palette, oils, pigments, a canvas on which to work, a studio or location in which to complete the work of art, and plenty of sunlight.

Likewise with the irisarian on thinking of that longed for, dreamed for vista of iris or rainbow iris border. He too must provide himself with certain materials, knowledge and plans.

When one begins with this subject of color arrangement, it is to be acknowledged that much of what will be written or said will be the personal preference of the speaker or writer. Like the artist we must have our space, sunlight, the plants, the planting plan, tools and a small amount of backwork. Now naturally you don't plant iris alphabetically in your garden—of course not!! Neither do you group the varieties by hybridizers or group them with all yellows together, all blues together, etc. Such arrangements would show lack of effort on the part of the gardener to carefully plan a border for harmonizing effect. You don't want a mumble-jumble of plants and neither does one wish to see such.

To begin with, to make a really successful Iris Border, one must know the iris varieties with which he has to work—he must know them very well. By this we mean that you must have some idea of the color (and at the same time pay some attention to a few rules of color harmony), height and time of flowering of each variety. Color design has decreed that certain colors "go well" together in a floral arrangement or in a garden setting. Example: Yellow and Blue.

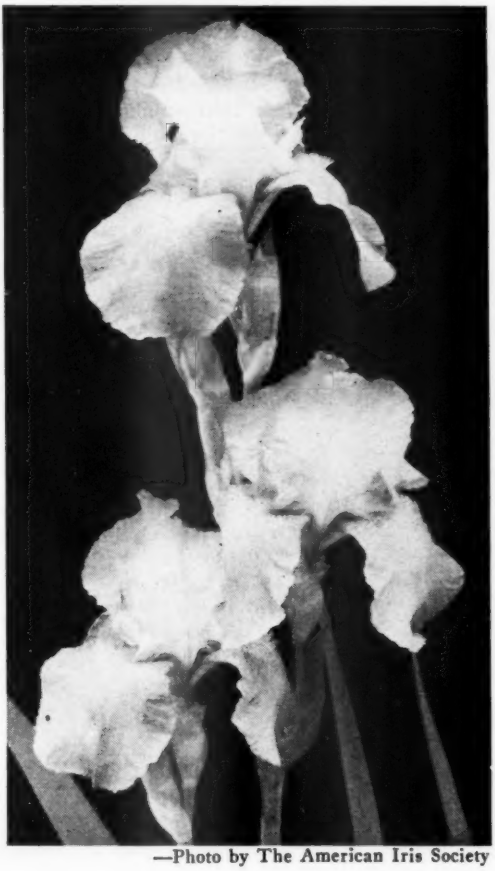
But here is something many have overlooked. One of the colors should be of a different intensity than the other. Example: A bright yellow is much better with a pale blue or a bright blue with a pale yellow. Try Elsa Sass with Narain or Happy Days

with Gloriole. And here is another paramount factor—a mass of the lighter color is best with a smaller amount of the darker or more intense color. Hence a mass of Gloriole would go well with Golden Hind.

You also must decide whether you are going to have one glorious, riotous intoxicating mass of color for a short period, the peak iris season, or whether you are going to have a well arranged border with some irises in bloom from early until late. Of course there is the individual who wishes some formal arrangement but at any rate the following remarks still should carry some weight. If you are planting a border for long season of bloom, irises are best combined with other perennials for otherwise many of the through blooming irises will tend to mar the general effect you are trying to achieve.

Hence, use a group of iris that have relatively the same blooming season (of course the tiny dwarf iris can always be used for front border purposes as most of them still have evergreen foliage even after blooming). Decide on the position for the border. It should be well drained and in the full sun for best flowering results and for best viewing of the enticing color combination you will soon achieve. Take some rough measurements of the site and then make a sketch on paper. This latter step is the artist's sketch and is very necessary for few individuals can hold the entire border pictures in their mind while planting. Another advantage of this paper layout is that this step can be accomplished early in the season prior to the time you actually can go to work in the garden. Some nurseries even have "flower planting blocks" of plants already laid out in chart form which you can purchase in multiple units. Most of these have been planned for proper color, balance and harmony.

Now few people can afford the space for a massive vista of displayed iris beds in which are varying shades of each color of the rainbow. So for the average gardener, he will now have to decide on the actual color groupings (mix his oils and pigments as it were). He will try to avoid clashes within each spacing of the border. There are some varieties (and colors) which will clash. For instance, Golden Hind with



—Photo by The American Iris Society

Iris Dreamcastle

The Sentinel or Naranja. In the former combination the colors clash and in the latter case, the colors kill each other. Or take Matterhorn and Bronzino. Here the white makes "mud" out of the latter. The following are presented as some distinct color groupings and suggestions as an artist might use.

Whites and Blue-toned Whites

Group these with sky-blues and pale orchid pinks. Examples—*Winter Carnival* or Matterhorn with Blue Shimmer or Overture; New Snow with China Maid or Narain; Thunderhead with Morocco Rose or Great Lakes.

Yellow Whites, Creams, and Parchment Shades

Combine these with pale orchid-pinks and also with pinks blended with yellow or the so-called "burnt-pinks." Examples: *Old Parchment* or William Carey Jones with Stained Glass, Spindrift, Melitza or Tiffany.

White Bi-Colors or Amoenas

Try this group with pure white and strong blue-purples. Plant a larger mass of the minority color and only an occasional plant of the darker color. Example—Amigo (or Louise Blake) with *Thunderhead* (or Snow King) and Sable (or Vatican Purple).

Plicatas

Being of a white or yellow ground marked with rose, blue or brownish red, they should be grouped with complementary colors that emphasize the plicata markings. Example: Wasatch with Sierra Blue; Winter Carnival or Tiffany with Chosen or Golden Treasure; *Blue Shimmer* with Violet Crown or Sharkskin.

Yellow Bi-Colors or Variegatas

This is one of the most difficult groups. Try them with the pale pure yellow selfs, pure brown selfs or with a bright orchid pink. They need to be combined with one of the elemental colors such as yellow, blue, or red. Example—Naranja or *City of Lincoln* with Tobacco Road, Dogrose or Pink Opal. Or try Frank Adams with Bryce Canyon and Golden Spike.

Yellow Selfs

Group these with either paler shades of yellow, with cream or with the sky-blues. The real deep bright yellow to orange will really be set off by the primroses, the creams, the dark purples or the mahogany reds. Example—Golden Hind or Happy Days with Snoqualmie, Solid Mahogany or Violet Symphony. Avoid use of yellow with any yellow blends as it will tend to make the blend appear dirty or dusky.

Yellow Blends

Here one finds a mixture of pastel arrangements in sulphur, silver and grey. These need a lot of doctoring to show them off to their best advantage—all because of their delicate, subtle color tones. Try them with the rich mid-blues. Example: Clara Neyes or Premier Peach with Narain or Missouri. If it contains buff, use blue and deeper tan colors. If it contains tan, combine with red-brown and pale blues. Apricots need more of same, such as deep pink or yellow to set them off. If the iris has a touch of salmon then use blue and purple liberally. Use colored pictures of iris against various colored backgrounds and you yourself will see the effect of this correct color charm.

Pinks and Pink Blends

These are usually blended with yellow or gold. Some may even have a flush of blue on the falls or an addition of a lavender touch. Group these with a straight lavender bi-color and see what happens. Example—*Pink Reflection,* Majenica or Remembrance with Lake George or Depute Nomblot. Use Melanie with Wakarusa and Golden Bear or Pink Cameo with Inspiration and Brown Thrasher.

Lilac Pink Shades

These are actually shades of orchid purple but in the garden they give a

pink effect. They are a far cry from the present true "pinks" of the modern hybridizer. Plant them with rich dark violet purples. Example—Frieda Mohr or Dogrose with Violet Crown, Indiana Night or Indian Hills. *Miss California* with Golden Eagle and Thelma Jean is a nice arrangement.

Purples and Red Purples

Here one finds perhaps more varieties than in any other color group. They are the mainstay of the color chart and nature uses this color liberally in her outdoor garden. Actually there are the mahogany coppery reds and the mulberry crimson reds with pink flush. Group these with the pink blends and the rich blues, yellows and creams. Example—Starless Night or Lord Dongan with Lake George, Missouri Night or Mellowglow. Or plant *Indian Hills* with Missouri and Ming Yellow or Destiny with Azure Skies and China Maid.

Browns and Bronze Purples

Here with this group, we need some lighter color to highlight the sombre tones. If the standards are buffish and lighter than the falls, then use a yellow blend to emphasize and enrich the whole effect. Plant these with yellow bi-colors, yellow blends and rich deep yellow selfs. Example—Bronzino or Casa Morena with Cloth of Gold or Golden Cockerel. Louvois with Berkeley Gold and Sable, you will really like.

Light Blues and Medium Blues

Now here is the heart of the entire border for blue (being predominant in the sky) which can be used to ad-

Iris Glen Ellen —Photo by The American Iris Society

vantage with so many of the other colors. You can even start your border layout by inserting the blues and then building around them. Try them with creams, yellows, and whites. Example—*Gloriole* and Elsa Sass; Gulf Stream with Kalinga. Even a blue-pink combination looks well. Example —Shining Waters with Miss California or At Dawning, Chicory Blue; Icy Blue with Fair Elaine or Song of Gold.

Dark Blues and Blue Purples

Here one runs to the sombre end of the color scale again and it is not advisable to use too many in the border. Use with plenty of the whites and light blues. Example—Winneshiek with Great Lakes or use Mt. Washington with Bonsor. Group Deep Velvet with Inspiration and Snoqualmie. Be sure you have a greater mass of the lighter color to lighten up the darker mass.

So much for the mixing of our pigments. Now for the actual painting of the canvas (getting the iris into the ground). Start from the middle of the border and plant toward the ends. Hence if you use too much space on one side for a certain variety or color you will have a chance to balance off the other side. Plant the individual rhizomes from 9" to 12" apart and point the cut end of the rhizomes in toward each other so that with time the plants will grow outward and leave an open center for the sun to enter. Plant in groups of threes or fives or sevens as these combinations provide for some irregularity. Also the fitting in of suitable colors and combinations of varieties can be more easily achieved.

Like a canvas newly painted, a newly planted iris border won't look as you expected. In fact for the first season it won't look like much, for there will appear to be too many spaces between the plants. But also like the canvas when viewed from afar so the iris border looks better in time. Then too you might, if you wish, interplant the iris with some tulips, crocus or other early blooming bulbs which will soon die down after blooming and not unduly shade the iris rhizomes. You will thereby have a border which will be highlighted with the green growing iris fans in the early spring and yet have a fine color grouping with the interplanted spring blooming bulbs. The bulbs can later be lifted and planted elsewhere if desired after the first year. After the third or fourth year the border should be either lifted or else the rhizomes thinned in order to secure the greatest crop of bloom.

Hence, with your canvas complete you can await the joy of each succeeding season of bloom. Visitors will admire your handiwork. You can have the pleasure of taking Kodachromes of a perfectly balanced color composite —your efforts with "Brushings of the Rainbow" have achieved their optimum.

Nature's Autumn Plant Exhibit

The leaves of our deciduous vines, shrubs, and trees contain green, yellow, and orange pigments but the green pigments completely mask the others during spring and summer. In autumn the green pigments are destroyed faster than they can be formed so that the leaves gradually turn from green to yellow and orange. The abscission layer at the base of the leaf traps the sugars which are turned to the anthocyanins which give the brilliant red colors to the sumacs, Virginia creeper, maples and many others. Birches turn from green to yellow and then white. Oaks develop tanins which cause their leaves to finally become brown.

A Compost Farmer

By CALVIN A. BYERS

AMONG the farmers of Lancaster county, Pa., where are the best and the oldest farms of our nation, are a few men who lead the thinking of the others. Such a man was my friend J—— whose keen observations and habit of travel—for the good of his church—brought back to his home farm many innovations.

He took me to his barnyard which had a bowl-like concrete base, large, with a berm-like drive around it. In late summer the place was empty, save for a round pile of grass and weeds, topped by stable manure.

He pointed to this place with pride and humility and said, "Here is where our success begins. Here is our factory. We throw into it all our hay that spoils, all the weeds along the fencerows, and from the swamps, the clover stuff after combining the seed. We mix in layers of cattle and hog manure and sprinkle on lime and phosphate rock and all the cleanings of everything . . . rotted sawdust, butchering wastes, once a month all the wood ashes from the two houses. Nothing is wasted."

"How much stock do you keep?"

"Cattle, 20 head, 5 horses, 50 hogs . . . two big stacks of straw that are worked through the barnyard every winter. Hogs do well nosing head deep in the stuff after a good rain or snow—they mix it better'n we can. The rain and snow helps to keep it heating some, that kills the weed seeds. By spring this pile is ten or twelve feet high and the raw material has lost itself so that all through it looks nearly the same. The worms come up from below and the chickens scratch for them . . . we have three times as much good fertilizer as we would get in the ordinary way; it's all ready for plants to use."

"How do you spread it then?"

"Haul it out and disk it right into the clover—then turn it under. We have 100 acres of farm land and every field is as good as every other—but it took ten years to make that possible."

"But why is your way better than to use commercial fertilizer?"

He studied a moment. "It's alive," he said. "We can work the land sooner and it doesn't wash. Neighbors buy their seed grain here because it grows better. Farming has more than the money profit that's in it . . . the fun lies in finding out new things. I'm fortunate in getting to go about the country . . . and I always visit the agricultural conventions, and the experiment farms. Whatever they have that's good, I try out at home. Change in the right direction makes progress."

I thanked him.

Keep A History Of Your Soil

By LAWRENCE LEMMON

SOME years ago I purchased a suburban place outside of Washington, D. C. When I looked at the soil that late February day it looked pretty sad. It was a yellow clayish sand with no indication of humus. Right then and there I got an idea. This land was mine. Why not improve it and keep a visual record of its improvement over the years.

With that thought in mind I got a one-quart mason jar and went about the place taking a trowelful of earth here and one there until my mason jar was filled. When it was filled I capped, labelled, and dated it.

In the ensuing summer and fall I did everything that a good Organic Gardener should do to improve his soil. That first year saw manure, compost and cover crop turned into the soil.

The second spring I collected a second jar full of soil just as I had done the first year. When I came to compare the two jars the difference in color and texture of my soil was amazing. It proved to me one important thing, that is, the rapidity with which a depleted soil can be improved. It also gave me the courage and incentive to do a still better job in the coming year.

This has gone on now for four years and I tell you just to show those four mason jars with their contents is convincing enough proof to the most skeptical observer. But best of all they make me want to go on in the Organic Way. Then too it's a constant source of pleasure to show these jars to friends in mid-winter.

Kodachrome Slide Library

READERS OF THE ORGANIC GARDENING Magazine are invited to help build a Kodachrome (colored) Slide Library concerned with all aspects of Organic Gardening and Organic Farming. We are especially interested in stages in the construction of a compost heap, views of organic farms and gardens, vegetables, fruits, seeds. We will pay $1.00 for each slide that we accept for the Organic Gardening Library. We hope that many of our readers will cooperate with us in this library.

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ORGANIC GARDENING WILL SOLVE YOUR GIFT PROBLEM!

COMPOST FOR TREES AND HERBS

By W. G. HYLTON

A ROCK pile which had been gathering trash and leaves for more than 50 years was removed and a peach tree set in the black soil and humus which is more than a foot deep. This tree has had no artificial fertilizer or manure of any kind; only a mulch of 4 inches of straw in doughnut-shape was applied last fall and since removed. Neither has it been sprayed nor treated with any chemicals whatsoever; nor has it been touched by borers, or insect pests of any kind. The photograph below shows this peach tree 16 months after planting. It is 10¼ feet tall, 9¾ feet from tip to tip in the spread of the branches, and measures 9¼ inches in circumference at the ground level. The measuring stick in the photograph is 12 feet long.

The giant Russian sunflowers shown in the photograph are growing in an old garden site which had not been plowed for more than 25 years. The heavy accumulation of grasses, clovers, and weeds was turned under in the early spring of 1947 and planted in potatoes. This was followed by a cover crop of rye in the fall which was disked into the soil this spring. The seeds were planted in hills of three spaced 4 feet apart each way. No artificial fertilizers have been used. The plants average 12 feet in height and many leaves measure 21 inches across. The growth is so dense that the planting has the appearance of a jungle.

BOTANY for the GARDENER (12)

By DR. WILLIAM H. EYSTER

The Plants in the Soil

The Yeasts

YEASTS were used in baking and brewing long before there was the remotest idea of what they are or how they cause fermentation. From the earliest times it was used for leavening dough, and in the great migrations of history care had to be exercised to take along yeast in some form. In the exodus of the Israelites from Egypt they left in such haste that the yeasts were overlooked and they soon found themselves under the necessity of eating unlevened bread. This was the origin and significance of the Jewish custom of eating unlevened bread in the feast of the Passover. It was not until about 3000 years later that men began to inquire seriously into the nature of a plant that had been so long and so intimately connected with their daily existence. In about the year 1680 the Dutch naturalist, Leeuwenhoek, examined a yeast culture under a microscope and noted that it always contained tiny floating globules. It was not until nearly 150 years later that Cagnaird de Latour, a French scientist, discovered that yeast is a living organism. Since then, the yeast has been classed as a plant belonging to the fungi.

Yeasts are widely distributed in nature and are even more important than bacteria in the production of organic compounds of commercial importance. Yeasts occur wherever there are sugars. Although soils are not their normal habitat, they occur in soils to some extent, especially in orchards and other areas where fruits are grown. Fruits, and especially the overripe nectar of flowers and saps on the outer part of trees, are unusually rich in yeasts. They are distributed by insects, some of which constantly harbor yeasts in their alimentary tract, by air currents and by running water.

Kinds of Yeast. Two great groups of yeasts may be recognized—true yeasts and false yeasts. The two most important species of true yeasts are *Saccharomyces cerevisiae* and *S. ellipsoideus*. *S. cerevisiae* is the species to which belong the yeasts generally used in the manufacture of bread and alcoholic liquors, and may be divided into (a) bottom yeasts used principally for brewing German beers, (b) top yeasts used for making English beers, and (c) distiller's yeasts which produce a larger percentage of alcohol than other yeasts. Yeasts belonging to the species, *S. ellipsoideus*, occur naturally on grapes and other fruits and are sometimes called wild yeasts. They are used to some extent for making wines and distillery products and in some countries are used in bread-making.

The false yeasts are regarded as "weeds" in the fermentation industries as they produce the disagreeable bitterness, unpleasant flavors, persistent cloudiness, and other undesirable characteristics of a fermenting drink.

Structure of Yeast Plants. Yeast plants are exceedingly small spherical or elliptical cells ranging from 1/25,000 to 1/250 of an inch in largest diameter. Many of them reproduce only by cell division and tend to hang together in loose colonies as illustrated in Fig. 29. Being a fungus, they lack the pigments which enable green plants to carry on photosynthesis. Each yeast cell (plant) contains a well organized nucleus which can be seen only in especially stained material. Each yeast cell has one or more conspicuous vacuoles which are filled with cell sap containing glycogen, a substance quite like the blood sugar in higher animals.

Fig. 29

Yeast Plant and Colony Formation

Growth of Yeast Cells. Yeast cells get the energy necessary for carrying on their life processes from sugars which they break down in a process known as fermentation. Fermentations are of such great importance that a full account of them will be given below. Yeast plants absorb nutrient elements from the fermenting medium and assimilate them so that they increase in size. That is to say, they grow by cell enlargement.

Reproduction of Yeasts. Under favorable conditions of moisture and temperature and in the presence of sugars, yeasts grow and reproduce rapidly. The yeast plant usually reproduces by a special kind of division called *budding*. When a plant approaches mature size, a small growth protrudes from one side or end. The material from the parent cell flows into this small bud which increases in size until it may be as large as the parent cell and indistinguishable from it. If undisturbed the two cling together for some time and other buds may appear so that an elaborate aggregate of cells is formed as shown in Fig. 29.

Under certain conditions the true yeast plants form spores inside called *endospores*. Each of these spores is capable of growing into a new plant.

Fermentation. Fermentations have long been known and used in the preparation of certain foods and drinks as well as such products as teas, tobacco, and flax. There is scarcely a natural process involved in agriculture and related industries that does not depend, in whole or in part, on some kind of fermentation. There are many kinds of fermentation, each of which is controlled by one or more specific enzymes. An enzyme is an organic catalyst which is produced by living protoplasm and determines the kind, rate, and direction of a chemical change in a living organism under the prevailing conditions. As an example of fermentation we may take the conversion of fruit sugar into alcohol and carbon dioxide with the release of energy. This fermentation may be written in the form of a chemical equation as follows: $C_6H_{12}O_6$ plus zymase equals 2 CO_2 plus 2 C_2H_5OH plus energy plus zymase which reads: a simple sugar under the influence of the enzyme zymas is converted into 2 molecules of carbon dioxide plus 2 molecules of ethyl alcohol with the release of energy which is used by the yeast plant. The zymase which acts as a catalyst of the fermentation process is not used up and so is still present when the fermentation is completed.

The more complex sugars as well as the many other carbohydrates as starches, pectins, and celluloses are first broken down by specific enzymes into simple sugars which are then fermented by the yeasts. The enzymes are produced by the living plants themselves.

Fermentations are commonly named according to the economically important product that is produced. When alcohol is a product of the fermenta-

tion, it is referred to as alcoholic fermentation. Not all fermentations are produced by yeasts, however. The hardening of cider which involves the conversion of alcohol into acetic acid is a fermentation that is caused by a species of bacteria. This is called acetic acid fermentation. The souring of milk, the curing of cheese, the retting of flax, the making of sauerkraut from cabbages, the turning rancid of butter, the ripening of cream preparatory to churning, the conversion of chipped corn plants into ensilage, and the making of compost are only a few of the innumerable processes which are vital to successful farming and gardening and which are caused by enzymes secreted by the living cells of many kinds of organisms. Even the digestion of plant tissue in the first stomach of cows and other herbivora, is accomplished in large part by enzymes secreted by bacteria. Here also lies the explanation of the changes that take place in urea and stable manure, and without which they would cease to possess their value as sources of plant nutrients.

The alcohol, acid, or other water-soluble product of fermentation accumulates in the fermenting medium while the carbon dioxide or other gas that may be formed passes off in the form of a series of bubbles. As the alcohol or other product accumulates, the rate of fermentation slows down and finally stops thus indicating the toxic effects of such products. The distiller's yeasts, for example, are more tolerant of alcohol than the top and bottom yeasts which are commonly used for making beers.

Yeasts and Compost. Yeasts play an important part in the compost heap in the decomposition of sugars, starches, and other carbohydrates. It is especially desirable to add yeasts to heaps which contain such plant residues as spoiled fruits, garbage, stems rich in starches as potato tubers and corn stalks, and fleshy roots as dahlia, dandelion, day lily, and the common root crop plants. To add yeasts to a compost heap, dissolve one or more cakes in a gallon of water and sprinkle a little of this yeast suspension on each layer of the heap. Because of the rapid growth and reproduction of yeast plants, the yeasts will soon invade the entire heap and rapidly digest the sugars and other carbohydrates. The yeasts in the compost heap will first break down the simple sugars and convert the complex sugars and starches into simple sugars by a battery of enzymes which are secreted by the yeast plants. All are finally decomposed with the release of essential nutrient materials in the compost heap and the evolution of carbon dioxide.

Tulips

Fosteriana Red Emperor, largest of all tulips and extremely early flowering, is featured in the 1948 Fall Catalog of the W. Atlee Burpee Co. This tulip, of the Species or Botanical type, has long bright scarlet petals and a black base bordered with yellow. Another offering featured is the Parrot Tulip, Fantasy, which has laciniated and fringed petals in bright geranium-red to shaded salmon-rose changing to cream-pink at the edges. Top size bulbs of these and many other tulips are available in quantity.

Also listed in the catalog are hyacinths, lilies, daffodils, crocus and other spring flowering bulbs for fall planting.

Organic Methods

By ROGER W. SMITH

OFTEN the gardener has to make the best he can of the small piece of ground that goes with his house. "This is your garden" he is told. So he takes a look at his "garden"—a terribly poor piece of ground it is after years of mistreatment. How can he bring to such a spot a touch of life? How can he convert it into a verdant garden?

The city gardener is not the only one who faces this problem, many suburban and rural gardens are unproductive beyond belief.

What we wanted to know was what organic methods could do under the worst of all possible conditions, keeping in mind the fact that the "gardener" was one person of limited means. Just what could the ordinary gardener do by himself, without great expense, to make of a dead back yard a fertile garden?

The garden soil of the place we selected was about as hard as concrete. Few weeds were able to survive. The area was not excessively shaded by crowding trees. It was open to full sunshine and because of this its surface was hard baked.

What about drainage? After a heavy shower, excess water soaked away easily although much of it ran off.

Such a garden, we estimated, might be cared for in the usual manner for many years before it became really productive. Under present conditions it would never be worth while. We proposed to make it productive quickly. So we began "spot gardening" in its most primitive form.

We dug a hole. The dead soil we removed was placed on the compost heap. The hole was about four feet wide and about one foot deep. At that depth the shovel failed to penetrate the hard subsoil.

What should be used to fill the hole? We could obtain compost humus but it seemed wasteful to use only mature rich humus. Finally we decided upon a mixture made up of one third sifted compost humus and two thirds clean sand.

A hole filled with such a mixture would seem to have all those qualities the surrounding soil lacked. It would retain moisture. It would be as well drained as the subsoil permitted. The sand would maintain a steady temperature.

We wondered if the garden soil was really as dead as it appeared. The effects of traffic and mistreatment might be remedied by organic methods.

Well watered when need arose, the hole—we got to calling it "the hill"—produced magnificently. It had been planted to cucumbers and nasturtiums. The little spot garden stood out like a brave green island in a sea of deadness.

Corn and squash and many flowers grow naturally in hills—what about growing pole-beans and melons and tomatoes by this method?

The following year we improved upon the crude "dig a hole" method. A good recipe for this improved method goes something like this. Dig a hole about four feet in diameter and a foot deep. In the bottom of this hole dig another hole about three feet deep and a foot in diameter. Fill the lower hole with good compost humus, pack well. Fill the wide upper hole with clean sand. Rich top soil or well rotted manure may be used as a poor substitute for mature humus. Sand is just sand.

The spot should be soaked with six to twelve gallons of water, preferably rain water. After the spot has settled it should be filled up with clean sand

but a slight depression should be left to indicate the hill and to collect moisture.

The deep, compost-filled hole serves as a reservoir for moisture, laden with natural plant nutrients within easy reach of plant roots.

That year we had excellent results from our spot gardens. We gave some of our flowers to the lady who lives down the street and she won a prize with them in the Flower Show at the School House. So we were well satisfied. We had made a big improvement by using spot gardening and were beginning to understand how to use organic materials and to appreciate the value, each in its own way, of clean sand and rich compost humus.

Then somebody told us about the "sunken barrel" method. In some ways this is an improvement over the "dig a hole" method. It goes something like this: Dig a hole at least a foot deeper and a foot wider than the butter-tub or other container to be placed in it. The sides of the container should be perforated with many small holes. Butter tubs are scarce these days, metal drums may be used if these are free from paint and oil and the like. We used many corrugated cartons and found these satisfactory.

In the bottom of the hole place about a foot deep layer of sand. Upon this place the container. Fill the container with good rich compost humus and fill in around it with clean sand. Soak well with ten gallons of water. Replace the settled material with more of the same kind. The edge of the container should stand about one inch above ground after you are through with your work.

In the sandy strip around each sunken barrel we planted seed. One hill was given over to cucumbers, another to mignonettes, another to melons, and so on. During dry weather a bucket or two of water was poured into each hill.

We had a very peculiar garden that year but everything flourished, the flowers were more fragrant and the melons more flavorsome than our neighbors'. The dead back yard was no more.

From spot gardening and the "sunken barrel" it was an easy step to organic "bed gardening". Today we use spot gardening and the sunken barrel to take care of unproductive corners. Under such conditions the sunken barrel can work wonders with strawberries, pansies, cucumbers, etc.

Instead of making a fertile spot with the use of compost, sand and water, why not construct a wide bed?

To be practical we thought of the surface of the dead garden as the subsoil which it really was. Leaching, erosion and excessive tillage had removed or destroyed the top soil. Suppose we marked off a small area and replaced as best we could what had been lost.

We looked over what organic materials we had—a couple of yards of good compost, many big heaps of leaves, some hay and stable litter, and so on. Then we marked off a small area some nine by sixteen feet. The area took up one corner of the lot, the most promising corner. We worked and planned and wondered and went ahead.

Over the marked area we spread a layer of what we had most of, rough straw and dried weeds with some stable litter. This we watered and rolled and stamped down as much as we could. When it was first applied the layer was about four inches deep.

This was followed by an inch deep layer of rough compost material. Upon this was spread a three inch layer of a mixture of well rotted straw, partially rotted leaves, spoiled hay and fresh grass clippings. The children did most of the trampling down of this layer and loved it. They stomped and stomped and, their faces glowing with eagerness, they asked permission to do more stomping.

Then the bed was soaked to make it as compact as possible. The watering was discontinued just as soon as water began to run from the bed. That was enough work for one day. The bed rested overnight. The foun-

dation had been laid; tomorrow we would build upon it.

We felt that a wooden frame would be necessary to hold the rest of the bed in place. So we gathered up a number of old boards and planks about six inches wide and made a frame slightly smaller than the bed we had built. This frame was filled with a five inch layer of a mixture made up of equal parts of ripe compost humus, clean sand, and rich top soil.

The bed was again compacted by soaking and additional compost was used to take care of settling. We found that mature compost had no real substitute, although well-rotted manure might be used in its place if necessity demanded this.

A bit later our bed garden simply bulged with flowers and vegetables. We eventually built four beds with neat straw covered paths surrounding them. By using organic methods the dead, can-strewn, garden flourished.

We learned from experience the value of a mixture of compost and sand. A shovelful of rich, compost humus and some clean sand can work wonders. It is difficult to say just why this should be so. But if we had to take over a badly treated, dead, back yard more than likely we'd spread over it a three inch layer of sand and a one inch layer of sifted compost humus and dig these in lightly.

This might not work as well as the spot garden or the bed garden but in it we have approached the problem of making the whole of the garden fertile and that is something.

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By DR. WILLIAM H. EYSTER

AMARYLLIS

The amaryllis plants which should have been kept outdoors during the summer in a location which has morning sun only and kept well watered and fertilized until the leaves began to die back, and which should have been shifted to the cellar to dry and rest when other house plants were transferred from garden to house should be fertilized with compost in November and given a thorough watering and allowed to remain in the dark until growth starts. Do not repot unless absolutely necessary as the amaryllis, like many other plants, blooms most generously when pot-bound.

~+~

CALLA

Pot calla tubers in a mixture of clay soil and a well-fermented compost in approximately equal amounts. The tops should be left exposed. Soak the planted pots thoroughly with rain water and keep them in a dark cool cellar until growth begins. Then bring them gradually to light and to a temperature of about 60 degrees F. Water freely with fermented manure water. The calla will bloom freely for a long time. At the end of the blooming period force the plant into dormancy by drying the plants gradually even though the leaves show no signs of ripening.

~+~

WINTER CARE OF LILIES

Snow is Nature's mulch and gardeners who are located in regions where the snow comes early, is deep, and remains late need not provide additional protection for their hardy lilies. However, in regions where the snow mulch is intermittent so that the ground is exposed to the low temperatures of the winter atmosphere, a plant mulch is absolutely essential. The greatest benefit of the mulch is the prevention of alternate freezing and thawing, which by its breakage of roots is most damaging. As soon as the ground is frozen, a thick coarse mulch should be placed over the lily plants. In the spring the ground will thaw somewhat more slowly under the mulch, thus delaying the appearance of the plants for some time and protecting the early species from frost injury. *Lilium regale* and *L. Henryi* are both easily injured by frosts and should be retarded by a mulch. It is especially important to mulch newly planted lilies as they are less hardy than well-established plants. In the spring the mulch should be removed just as the first shoots of the earlier starting species are piercing the ground.

~+~

WINTER CARE OF CHRYSANTHEMUMS

Do not be overkind to your hardy chrysanthemums by too much winter covering. Permit the plants to mature properly and get hardened by a good frost before mulching them. Cut the tops off within 6 inches of the crown and work compost lightly around the plants and cover with plant material that permits aeration. Hemlock or

spruce branches make an ideal winter covering for chrysanthemums and delphiniums. The branches should be laid flat so as to form an effective barrier to the wintery wind and the action of the sun. Over the branches may be a sprinkling of leaves to fill the gaps between the branches. By thus imitating Nature one can give the chrysanthemums the ideal winter covering.

~+~

EVERGREEN CUTTINGS

Cuttings of mature twigs of evergreens may be taken anytime during November and December. The end of a twig from 4 to 7 inches long with the leaves trimmed off the lower 2 or 3 inches constitutes a suitable cutting. Use a sharp knife as a clean cut must be made. Insert the lower part of the cutting from which the leaves have been removed in a box 4 inches deep filled with clean sand. The cuttings should be placed in rows. When the box is filled with rows of cuttings, a piece of wood which just fits between two adjacent rows should be placed between row 1 and row 2 and hit with a hammer until the sand is well packed down. Then repeat this process between each of the other rows until the sand in the entire box has been packed down. This removes all air pockets and insures better root formation. Most cuttings will start to form callus is about 3 weeks but some as the yews, retinosporas, and cypresses will require a longer time. By the end of April the cuttings will be sufficiently rooted to be set out in beds in the garden.

~+~

LILIES PLANTED IN NOVEMBER

Bulbs of *Lilium auratum* and *L. speciosum* usually do not arrive before November, but should be planted as soon as they do arrive. To prevent the soil from freezing where the bulbs are to be planted, pile manure over it. Since both of these species are stem-producing, the bulbs should be planted from 8 to 10 inches deep. It is a good plan to place a little sand in the bottom of the hole and place the bulb, right side up of course, on the sand.

~+~

BIENNIALS IN EARLY SPRING

If you have started pansies, violas, English daisies, or other biennials from seed and if you have a coldframe, you can get them into bloom very early in the spring by transplanting them to the coldframe in November. They will make considerable growth before the soil freezes in the coldframe and will burst forth with new growth in the spring before the outdoor plants have thawed out.

~+~

PLANT BULBS NOW FOR EASTER BLOOMS

The bulbs should be planted in pots filled with equal parts of sand and compost with the top of the bulb at or just above the surface of the soil. Space the bulbs about 1½ inches of clearance between the bulb and side of the pot if planted singly and about the same distance apart if planted several bulbs in each pot. Do not plant more than one kind of bulb in the same pot. Place the pots that have been planted in wooden boxes, for example apple boxes or orange crates, loosely and fill the spaces between the pots with peat moss. The boxes should then be placed where it is cool as on an unheated but enclosed porch, garage, cellar entrance, or outside under leaves or other protective mulch. The soil in the pots should be protected from freezing temperatures for the first 6 to 8 weeks when roots are being formed. It takes from 6 to 9 weeks for the bulbs to grow into blooming plants after they are brought indoors. When brought indoors, it is best to introduce them to higher temperatures gradually, say 50 degrees for 3 weeks and then 60 degrees for another three weeks before bringing them into the living room. This will insure a good stocky plant with full-sized flowers.

Garden Calendar—November

Most plants have completed their growth for the season and Nature is busily engaged tucking them in for the winter. The annuals have ripened their seeds and the plants, roots and all, are dying and returning to the soil as food for the soil organisms. The biennials, as Oenothera and foxglove, which grew from the seed in spring consisting of a large root filled with stored foods and a small crown stem spend the winter in the soil and beneath mulches of plant materials. The herbaceous perennials, as peony, hollyhock, perennial phlox, and all bulb-producing plants die down to the ground level in autumn and spend the winter under ground as underground stems or bulbs. Only the woody perennials and the boldest, creeping herbaceous perennials hold their ground and defy the changing temperatures and driving winds of the winter atmosphere. The herbs cling closely to Mother Earth, while the woody plants either protect themselves from too great water loss by dropping their leaves (deciduous shrubs and trees) or by coating their leaves with a thick layer of a waxy substance called cutin. Also the wood of the twigs is dessicated and hardened, the buds are usually coated with scales like shingles on a roof and these are insulated with hairs, scales, and wax.

Too often, unfortunately, November is a month when the urge to "garden" is at its lowest ebb. We have taken all from the garden that can be used as foods for ourselves, and forget entirely that the soil also needs foods. Let us awake to the importance of feeding the soil organisms. Let us return to the soil all plant and animal residues as we see it practiced in the forest and woodland. Let us assist Nature in tucking the plants in for the winter by applying to our plants a protective layer of mulch. Snow is Nature's mulch in the north while farther south a plant mulch must be substituted.

THE NORTH

Flower Garden:—All plant residues should be cleaned off the garden and removed to the compost heap where it may be converted into compost. In a properly made heap weed seeds will be killed as will also all fungi on diseased plant parts. After the ground has frozen, a suitable mulch should be placed on the perennial bed to prevent or reduce to a minimum freezing and thawing. A suitable mulch would be a thin coating of compost overlain with a layer of leaves several inches thick. Finish planting tulips, lilies, and other bulbous plants.

Shrubs and Trees:—As soon as shrubs and trees have dropped their leaves they may be transplanted. For roses the soil should be prepared to a depth of 18 inches and have mixed in it liberal amounts of compost and bonemeal. Climbing roses may be protected for the winter by laying them on the ground and covering them with a few inches of soil. Water the evergreens and give them a mulch of leaves several inches thick. Remove all suckers from the lilac bushes and give them a liberal dressing of compost made with lime.

This is a good time to make cuttings of evergreens of all kinds and of

deciduous shrubs and trees. Tie the cuttings of the deciduous plants in bundles and bury them in moist sand and keep them in a coldframe or cellar during the winter. Such cuttings will root easily in sand in the Spring.

Berries:—The strawberries, raspberries, blackberries, currants, and gooseberries should be fertilized with compost made without lime. As soon as the ground is frozen, mulch the soil with plant materials having no weed seeds. Sawdust may be used to good advantage.

Vegetable Garden:—After all plant residues have been removed from the garden the soil organisms should be fed by working a one-inch layer of compost into the surface layer of the soil. Celery and such root crops as beets, turnips, carrots, and rutabagas should be stored for the winter table. Spinach, kale, mustard, parsnips, and carrots can stay in the garden for early spring use. A good mulch will help these plants to withstand the winter temperatures.

THE WEST COAST

Flower Garden:—Such hardy annuals as larkspur, bachelor button, godetia, Virginian stocks, nigella, anagallis, poppies, and sweet peas may be sown outdoors in November. Some of the finest sweet peas are obtained from November sowings. They bloom earlier, have better blooms, and continue over a longer period because of their more extensive root system. Also may be sown perennials which have seeds with hard seed coats. The freezing and thawing will help crack the seed coats and thus aid germination. Nearly all lilies do well and should be planted at this time. Mulch the chrysanthemums with loose material which will permit the free circulation of air.

Vegetable Garden:—There is still time to sow seeds of vegetables for early spring use:—garden peas, windsor beans, onion sets.

Shrubs and Trees:—The roses may be pruned anytime between November and February, but should be planted in November. Do not fail to have some of the occasional roses including the stronger types like floribunda, pillar, climber, and the species roses for covering banks, angles of buildings, and walls. The winter garden may be made gay by including the pyracanthas and the many cotoneasters with their scarlet berries, laurestinus with its metallic blue berries, the low-growing pernettyas with berries ranging in color from white to pink-rose. Both cone-bearing and broad-leaved evergreens may be planted this month.

THE SOUTH

Flower Garden:—This is an excellent time to have a Chrysanthemum show as these magnificent flowers bring the flowering season to a close. Plant spring-flowering bulbous plants and sow sweet peas.

Lawn:—If the winter lawn has not yet been planted, it should be done without further delay.

Shrubs and Trees:—This is the best season for transplanting and pruning deciduous shrubs and trees, including roses. At this season also the Christmas holly can be transplanted most easily. This is a good time to plant all kinds of berries.

Vegetable Garden:—The hardiest of the cool-season vegetables may be planted this month for late winter and early spring use. Lettuce and radishes should be planted in hotbeds and coldframes for winter use. Clear away all dead plant materials and use them in the compost heap. Plant asparagus, rhubarb, and cabbage.

THE DEEP SOUTH

Flower Garden:—Florida lives up to the name given it by the early Spanish settlers, The Land of Flowers. In December, when many northern plants

hibernate during the freezing weather, Florida flower gardens are alive with color. Among the many flowers suitable for planting this month are: ageratum, alyssum, African daisy, aster, bachelors' button, double camellia-flowered balsam, calendula, calliopsis, candytuft, carnation, Shasta daisy, dianthus, gaillardia, hollyhock, larkspur, lupine, nasturtium, pansy, phlox, petunia, salvia, snapdragon, sweet pea and verbena. For spectacular effect, the flame vine can hardly be excelled. Once started it runs riot over fence, trees or any convenient support, and is easily started from the numerous volunteer roots.

Vegetable Garden:—A good use for sweet potatoes is to make them a part of the poultry feed. The writer has used them raw, put through an ordinary household grinder, without dehydrating. The coarse shreds are relished by chickens. A request to the Florida Agricultural Experiment Station brought the response that they could be used to advantage up to 20% of the total ration. Considering the high feed costs, a good crop of sweet potatoes might well be raised in the garden. All the culls as well as the over large potatoes not readily marketed can be utilized.

Shrubs and Trees:—Citrus growers are finding that the free use of the powerful poison sprays is not an unmixed blessing. Among other objections to the deluge of poisons all over the trees, many bees are being poisoned; and without bees blossoms remain unpollinated. A trial of organic fertilizer from the compost heap might be well worth considering. This has already been done on a small scale on a non-commercial basis using no commercial fertilizer and no poisons of any kind. The result is that the trees are in better condition than in former years when both were used.

Erosion

Henry G. Bennett, President of Oklahoma A&M, is quoted as saying that, if Oklahoma continues to lose soil in the next 53 years as rapidly as it has during the past, farming will be confined to a few isolated, protected valleys. It is imperative therefore that every land owner conserve his topsoil. The average soil loss from bare, hard fallow land at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma, was 1100 times more and the runoff water was 31 times more than from similar soil covered with Bermuda grass. Daniel, like so many others today puts the emphasis upon pasture. Pasture which provides livestock with a maximum amount of nutritious grass forage will do much toward producing more food and at the same time conserving the soil.

—*The Land Letter*, August 9, 1948

ORGANIC GARDENERS' DIGEST

By DR. WILLIAM H. EYSTER

CARE OF HARVESTED VEGETABLES

Root vegetables should be "beheaded" as soon as they are harvested. While the vegetables are growing in the ground, the leaves manufacture sugar, starch, protein, and other nutrients and pass them down to the roots for storage. But when the vegetable is harvested and the roots are out of the ground, the situation is reversed, and the leaves draw on the moisture and nourishment of the roots to keep alive. So when the tops of carrots, turnips, beets, and other vegetables are cut off as soon as possible they will look fresher and have more nutritive value.

—*Life and Health,* April, 1948.

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COVER CROPS FOR VEGETABLE CROP SOILS

The productivity of truck soils may be stepped up by the regular growth of cover crops. One of the best yielding of these is crotalaria, but other commonly used legumes are soybeans, cowpeas, vetch, winter peas. A number of these legumes in mixed planting is better than a pure stand of one kind alone. Since there is little to return to the soil from vegetable crops, it is absolutely essential to grow deep-rooted legumes to absorb minerals from the subsoil and deliver them with the vegetable matter in the top layers of the soil.

—*Market Grower*

—o—

NEMATODE CONTROL

Crotalaria is an especially valuable legume to be used as a cover crop as it yields an unusually large amount of dry matter and it seems to aid in the control of nematodes in the soil.

—*Market Grower*

RHUBARB

Rhubarb will not grow well in soil that is too acid. The soil should give an acidity test of about pH 6.5. If the soil has a greater acidity than this, raw ground limestone should be added to the soil. When making a new planting, old roots should be dug up and separated so that one vigorous bud may be attached to each portion of the root.

—*Horticultural News*

—o—

HARDER WORKING BEES

Prof. W. A. Price, head of the department of entomology, Agricultural Experiment Station, Lexington, Ky. told a meeting of Kentucky Beekeepers Association that soon harder working, gentler bees would be available. In the breeding of bees, more attention is being given to the value of bees as pollinators. It has been shown that the yield of red clover seed can be increased from about one bushel per acre, which is about the average without domesticated bees, to 12 bushels per acre with bees and 100 percent pollination.

—*Seed World,* May, 1948

—o—

HIGH-YIELDING, GIANT WHEAT

A wheat with giant-sized kernels was recently produced by Dr. Karl Sax, director of the Harvard Botanical Garden. Although Russia reported the production of such wheats in 1944, no seeds were made available to the United States. According to the Russian scientists this giant-kerneled wheat is resistant to rust and to practically all other fungus diseases. It is said to be able to withstand droughts and to produce up to 144 bushels of wheat per acre.

ARTIFICIAL FERTILIZERS KILL BROOK TROUT

According to the *Pennsylvania Angler* for March, 1947, artificial chemical fertilizers which leach out of the soil and drain to the streams kill the brook trout. Water for the Bellefonte hatchery comes from Penns Valley, traveling through underground channels. There is intensive farming in the valley, and the use of chemical fertilizers is widespread. During rains, water falls on this fertilized soil, absorbs some of its chemical elements, and soaks down through the ground into the limestone pockets where it accumulates as the source of supply for springs. The chemicals which the water has absorbed from the soil react with lime and may form gases detrimental to waters used for hatchery purposes.

These harmful chemicals are not present in the water at all times, but rather appear in surges, depending on rainfall and other factors, but they are so deadly that should they make their appearance for only a few hours all the fish in the nursery pond would be killed.

—o—

BEES AS POLLINATORS

Bees are far more important in fruit production than most people realize. According to Dr. George M. List, chief entomologist for the Colorado A. & M. Experiment Station a bee can carry as many as 100,000 grains of pollen. A grower in Grand Valley found that bees placed in his sweet cherry orchard produced "amazing" results—trees which had never produced a full crop in 15 years were loaded with fruit.

—*American Fruit Grower,* April, 1948.

—o—

WALNUT STOCKS

According to a recent announcement of the Northern Nut Growers Association, the Texas walnut *Juglans rupestris* and the Arizona walnut *Juglans major* have been found to be superior stocks for grafting the California walnut, *J. hindsi.*

—*Horticulture,* January, 1948.

A MUM FOR MAINE

The Chrysanthemum, Clara Curtis, is one perfectly hardy variety that will flower in the open in Maine. It is a delightful single pink and forms a fine display in September. This mum is so hardy that it withstands the Maine winters without protection of any kind.

Arthur E. Thatcher,
—*Horticulture,* January, 1948.

—o—

DRONES ARE WORKERS

It is a common belief that the drone bee is a worthless male. Ever since Aristotle referred to the drone in the most disparaging terms, in his treatise on bees, the word drone has been regarded as synonymous with laziness and all that it implies. Mother Nature never makes mistakes in perpetuity nor does she create any creature without fullness of purpose. Every member of the bee colony is vitally essential to the welfare of the whole, and the drone is no exception.

The larger, stronger and more virile drones live on the average about two months, but they are no mere playboys. The drone is the only member of a bee colony who is allowed to visit other hives where he is cordially welcomed and made a fuss of as guards make way for him and touch antennae with him in obvious appreciation of his arrival.

The bee hive has air-conditioned, circulated heat with an average temperature of 94 degrees F. One of the duties of the drone is to serve as a heat generator. Because of his greater bulk and strength he absorbs more oxygen and his blood-pumps are more powerful to deal with it. So much so that he can produce considerably more heat than any other member of the hive. While radiating heat the drone feeds voraciously on the freshest nectar because this contains the most moisture, and without adequate moisture he would literally burn up.

—*Country Living,* Book 9

SAVE THE BUMBLE BEES

By ARNOLD G. INGHAM

MOST farmers of today, with their heavy machinery and artificial ways of doing everything, seldom stop to consider that their success depends on old Mother Nature just as much as when man lived off the wild fruit and game, and grew his "cultivated crops" in little clearings in the forest. Many have given up trying to grow old fashioned red clover because it has become a poor crop to depend on. I can remember seeing red clover grow year after year without reseeding whenever the land was allowed to "rest", or "go back to clover" as the old timers used to say. That was on land that had recently been cleared from virgin forest that was mostly white oak, hickory, walnut, cherry, and dogwood. After the original topsoil was gone such land got "clover sick" and had to be limed and fertilized in order to make red clover grow on it again. Even then the results were seldom profitable and we had to find other legumes that would grow on worn out soils.

When we went back to grassland farming we first tried to find plants that would grow on acid soils. Korean *lespedeza* and *Sericia lespedeza* came to our rescue and we started on the road back. White clover and bluegrass gradually crowded the lespedezas and gave us grazing every month in the year as the topsoil was rebuilt. Land that looked like pure white sand ten years ago is now under a dense sod and has a layer of dark topsoil six to ten inches deep. No dirty water runs off these fields and the cattle no longer care for grain or hay and grade "good to choice" where they used to go in the "utility" grade. Our horses stayed on pasture all last winter and never came through in better condition. Bluegrass and white clover are making room for orchard grass, timothy, tall meadow oat grass, sweet clover, black medic, and old fashioned red clover just like we used to see in early days!

Last week bumble bees chased our team out of the pasture when we were mowing down the extra grass to make into stacks that give us June grass in the winter. These stacks are what Professor Wilbur J. Fraser of Illinois called "pasture barometers" because they tell when the grazing is below par. The man who was driving the team wanted to know if we ought to burn out the bumble bees. "No Sir," I said, "those bumble bees are worth more to that pasture than all the mowing we can do." Without bees there would be no seeds. In the early days in Australia they found that red clover never made any seed. After they brought in bumble bees the clover made good seed and made it possible for the farmers to produce other crops like wool and wheat that are the basis of Australian agriculture. At one time it became almost impossible to produce viable clover seed in England. Charles Darwin, who was then a young naturalist, was sent to find out what was the trouble. He told the farmers to let house cats run in their fields as the field mice were destroying the nests of the bumble bees. After the cats got busy it became possible to grow clover again.

We are going back to red clover. As our pastures improve we find that red clover comes back and as red clover comes back our pastures will improve. The Romans used to believe that red clover was a great "pumper" that brought plant food from deep in the ground up to the surface where other plants could use it. They may have been right to a great extent but we know now that clover is a legume and has a little partner in the nitrogen gathering bacteria that make the nodules on its roots. Nitrogen is the most important of all the plant foods and the most expensive to buy; but is free to the farmer who works with Nature. Save bumble bees and their relations. They are your partners.

The Soil and Health Foundation

The Soil and Health Foundation has celebrated its first anniversary with the issuance of the first bulletin under date of October, 1948. The Foundation is still in its infancy and is badly in need of funds to enable it to grow to sufficient size and maturity so that it can carry out the purposes for which it was organized. A biochemical laboratory has been built and is ready to be fitted out with equipment so that the experimental work may be started without further delay. The tremendous importance and urgency of accumulating data to show that the health of plants, animals, and people have their source in the soil are indicated by many letters we have received from those who have already contributed generously to the Foundation. Some of these letters are reproduced here.

"A safeguard against the overthrow of our government by any agency whatever will be an orderly overhaul, a reconstruction, adding, among other improvements, the physical well being of the living soil and the bodies of all its people to the freedoms conceived by Thomas Paine and brought into full being by General George Washington and those who dreamed, fought, starved, froze and bled with him. Has an agency been started to promote the "Organic Way"? There has. It is the "Soil and Health Foundation," much in need of advertisement and funds. Extended research and comparative tests are in process and contemplated. Those caring to contribute with funds or in any other way may write to Mr. J. I. Rodale at Emmaus, Pa., mentioning this discussion, or to the writer. Millions have been collected in recent drives for purposes no more worthy."

—Addressed to Reunion of Class of 1905, Columbia University, by H. C. Haas, 171 Lyons Road, Scarsdale, N. Y.

*****

"My husband has done commercial orchard work on about 500 acres of orange groves for at least 25 years. We have learned through bitter and costly experience the damage caused by the use of chemical fertilizers on our orange groves. For quite a number of years we have been applying only organic fertilizers and the groves are recovering. The fruit also is improving in quality and size and packing house managers have noticed the difference. We are vitally interested in organic gardening and any program relating to soil and health."

—Mrs. R. W. Dickerson, Route No. 1, 9471 Loara St., Anaheim, California.

*****

"Please accept this check as a contribution to 'Soil and Health Foundation' which has a program worthy of the support of all who desire agricultural practices that best benefit the interests and health of our people."

—Arnoldo Johnson, Route 1, Box 482 A, Kirkland, Wash.

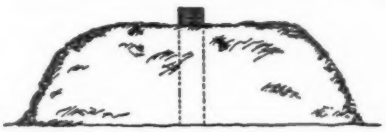
*****

"In response to J. I. Rodale's clarion call for the rest of us to continue to carry on and develop the work which Sir Albert Howard so faithfully and so nobly began, we are enclosing our check as a contribution toward carrying on that work through the Soil and Health Foundation. We are hoping for splendid work from the Foundation, and grand results. Of course, we know not to hope for too much too soon. You will be hearing from us from time to time with such help as we feel free to give."

—Mr. and Mrs. J. Smith Knapp, Organic Gardens, San Lorenso, Calif.

*****

The Foundation is now placing its order for the laboratory equipment and materials needed for bacteriological and biochemical studies to be made, and is seeking a properly trained biochemist to carry on the experiments. Contributions will be especially appreciated at this time to meet the expenses involved. All contributions should be sent to Soil and Health Foundation, 46 South West Street, Allentown, Pa.



Compost Clinic

The Compost Clinic has given consideration to the green matter, the mature, and the soil which are necessary for the construction of a heap according to the Indore method as recommended by the late Sir Albert Howard.

The decomposition of the plant and animal residues in the heap involves many kinds of fermentation and the production of carbon dioxide and various alcohols and acids. If an acid compost is desired, lime must not be added. If a distinctly acid compost is needed for such acid loving plants as rhododendrons, camellias, and blueberries acid peat may be used instead of soil. For compost which is to be used for plants which prefer neutral or slightly alkaline soils, a sprinkling of pulverized limestone should be added to each layer of the heap. The limestone will neutralize the acids and tend to prevent the escape of volatile fermentation products which would otherwise diffuse into the atmosphere. Pulverized dolomite instead of ordinary limestone which is a calcium-magnesium lime may be used in making the heap. Other forms of calcium which are recommended for the compost heap are pulverized oyster and clam shells and egg shells.

If the soil to be treated with compost is known to be low in phosphorus, raw pulverized phosphate rock should be used in alternate layers with the pulverized limestone. Other deficient elements may likewise be added by adding pulverized rocks which contain them. It is possible that native rocks in any locality could be found which could be pulverized and added to the soil to make up for any elements that tend to be deficient in the soil. This would be both practical and economical as there would be no freight charges. The total cost would be that of crushing the rocks and the hauling from the crusher to the farm.

Deficient elements can be added in other ways, especially by adding to the compost heap plants which contain them. Seaweeds, such as the kelps, are rich in such elements as iodine, boron, copper, magnesium, calcium, phosphorus, and many others and should be used in the compost heap by all who can get them economically. The water hyacinths which grow so abundantly in the rivers of the South are especially rich in many of the elements which are apt to be deficient in the soil. It would seem that Mother Nature fashioned this plant for the special purpose of absorbing the precious elements which have been leached out of our agricultural lands and are being carried ruthlessly to the sea. Water hyacinths can be pulled in to the shore by a floating rope and lifted up on the bank with a simple kind of elevator. When their water content has been reduced to about 40 percent, they can be used in the compost heap as green matter or used on the soil as a mulch. Regardless of how they are used they add an abundance of nutrient elements to the soil.

Autumnal leaves represent still another important source of elements which may even be deficient in the surface layers of the soil in which the trees are growing. Many trees are deep rooted and absorb minerals from the lower soil horizons. These minerals in varying amounts are present in the leaves as they fall from the trees and

(*Please turn to page* 54)

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SOLLY'S FLOWER BOOK — Annual Flowers by Cecil Solly (Puget Sound Seed Company, Inc., La Conner, Washington.) 1948. $1.50.

The author has given his readers a delightful account of the more important garden annuals. A short but clearly written account gives us an appreciation of the newer and better varieties that have been introduced during the past several years. The flowers are presented as hardy, half hardy and tender with important information on all cultural methods including sowing the seed, transplanting the seedlings, arrangement in the garden according to color, size, and time of flowering for the best results in the garden.

WOMAN'S HOME COMPANION GARDEN BOOK by John C. Wister (Doubleday & Company, Inc., New York, New York. 1947. $4.95)

This book is an up-to-date, well-written, profusely illustrated, comprehensive guide for the experienced amateur gardener as well as the beginner in every section of the country, with a foreword by the famous horticulturist and gardeners' friend, Liberty Hyde Bailey. The material in the book is well arranged and easily accessible. It treats in a concise manner all aspects of gardening: design, color, planting plans, soils, lawns, planting, maintenance, propagation, and friends and enemies of the garden. Special emphasis is given to the plant materials for the garden.

STUBBLE-MULCH FARMING to Hold Soil and Water. Farmers' Bulletin No. 1997. U. S. Department of Agriculture. (Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. 10 cents.)

This bulletin describes a system of farming in which the residues of the crops grown are used as a mulch to conserve soil and water. Instead of removing, destroying, or plowing under the residue you leave it on the surface of the soil so that your fields have a year-round cover. Thirty-two pages of clearly written procedures with profuse illustrations.

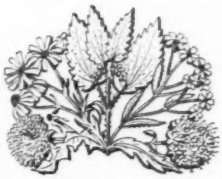
Books by Dr. Ehrenfried Pfeiffer

International authority on Biodynamics.

THE EARTH'S FACE AND HUMAN DESTINY

Nothing is so stimulating as a look at the earth's surface as a whole. The total life of a region is commonly referred to as a landscape. Dr. Pfeiffer discusses the landscapes of the earth in relation to the geological and biological forces which have been responsible for them. Beauty may be defined as harmonious expression. A beautiful landscape is biologically sound. When we upset Nature's balances and expose the earth's face to destructive forces we destroy beautiful landscapes and convert them into something artificial and ugly. This book deals with healthy and diseased landscapes through all phases of their deterioration or improvement—problems of the plain, the mountains, the woodlands, and the parks and gardens. Man has been more destructive to the earth's face than almost any geologic agent, and he must be constructive in shaping his environment or it may become a barren wasteland. *Cloth.* 183 pp., 60 illus., frontispiece in four colors. **$2.75**

BIO-DYNAMIC FARMING AND GARDENING



The author asks his readers to look back to the agricultural practices of yesteryear when the farmers and gardeners followed the course of nature in tilling the soil, in planting, and in harvesting in an almost instinctive manner. Gradually emphasis was shifted from nature's ways to the ways of man, from an economy based upon the soil to one based upon the dollar. In simply written but masterful style, the author surveys the world situation in agriculture, the farm in its wider connections, soil as a living thing, and proper feeding of the soil to maintain its fertility and productiveness. Comments are made on forestry, gardening, the dynamic activities of plant life, the relation of fertile soil to health, and practical results of the bio-dynamic method of farming, a method based upon the return of all plant and animal residues to the soil whence it comes. *Cloth.* 240 pages, 18 illus. **$2.50**

GROW A GARDEN

In this small book, Dr. Pfeiffer gives undivided attention to problems of the garden and is quite chatty with the gardener. In the first line he puts his finger on the essence of the good life, namely self-sufficiency. This involves careful planning and a full understanding of nature's ways. First consideration is given to the home garden and the planting of gardens and homesteads. The author discusses size and yield, digging and cultivation, watering and irrigation, the preparation of composts and fertilization, sprays and spraying, and hotbeds and coldframes. For tops in gardening one must understand the value of crop rotation, the significance of mixed culture. He concludes with practical cultural directions for various vegetables in the home garden and the importance of herbs in the home and on the farm. *Paper.* 118 pp., illus. **$1.40**

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ORGANIC GARDENING Emmaus, Pa.

COMPOST CLINIC

(*From page* 51)

form a mulch on the ground in autumn. This remarkable method used by Mother Nature to keep the surface layers of the soil supplied with elements from the deeper soil horizons is not appreciated by most gardeners and farmers, judging from the common practice of burning autumnal leaves. Even colleges and universities rake all the leaves from the ground beneath the trees which they prize so highly on their campuses and haul them to the dump or burn them. The inevitable result is that the soil beneath the trees is populated by a few sickly grasses and such native plants as can get along with a minimum of the essential elements. Invariably also the trees become diseased and infested with insects and die prematurely. The college leaf burners are fighting Nature instead of working with Her and the campus becomes an artificial grouping of dying trees and shrubs.

To hasten the composting process plant materials and especially leaves should be put through a grinder as will be discussed in a later clinic. If leaves are used without being ground they should be mixed with other plant material to keep them from packing into tight layers which cannot be sufficiently aerated for proper composting.

Compost Correspondence.

WHEN SHOULD COMPOST BE APPLIED?

Q. When should compost be applied and how should it be applied?
V. C., Bronx, N. Y.

A. Compost may be applied to the soil at any time that it can be worked into its surface layer. Spread on the

soil a layer about an inch thick and then work it into the soil lightly. Compost represents food for the soil organisms and the latter should be kept well fed.

—o—

TOADSTOOLS IN THE COMPOST HEAP

Q. Would it be advisable to incorporate the toadstools in my compost heap which are growing in large numbers under my willow trees?

Mrs. O. H., Missoula, Montana

A. Toadstools are especially good for the compost heap as they usually contain copper as well as other of the minor bioelements.

—o—

DRIED SEWAGE SLUDGE

Q. Does dried sewage sludge have the same value as compost?

V. B., Lebanon, Pa.

A. No. Dried sewage sludge is far from compost. It contains raw organic matter which should be thoroughly composted with other materials before being used. In many cities it contains poisonous factory waste matter which goes into the sewage system and traces of which remain in the sludge. Sludge is usually lumpy, and will not break down in the compost heap unless it is either ground up or mashed with a sledge-hammer.

—o—

WILL HEAVY STEMS COMPOST?

Q. Will the heavy stems of brussels sprouts, cabbage, and pelargonium break down in the compost heap?

E. L. R., Carmel, Calif.

A. Yes, they will break down in a reasonable length of time because they are more or less succulent and watery, that is, the cells of these types of plants are not highly lignified. They are not woody, in other words. Such material like heavy twigs would not break down easily. The stalks of field corn are more fibrous and will take

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long to decay unless the heap where they are layered is kept unusually wet. Where large quantities of such corn stalks are to be composted it would be best to put them through a corn shredder.

—o—

LEAVES FOR THE COMPOST HEAP

Q. Can oak leaves be used in the compost heap?

R. H., South Branch, Mich.

A. Yes, by all means. The average gardener has been loath to use oak leaves because they are on the acid side, but if too much of this material is not used in one heap, the composting process will neutralize their acidity. It is best to mix such leaves with weeds or grass clippings, but weeds would be better than grass clippings in this case. If the oak leaves are piled on too thick they will cake up and prevent proper aeration in the compost heap. On a large scale it would pay to have some kind of grinder that would shred the leaves. Where oak leaves are piled in heaps by themselves to become leaf-mould, such an end product after several years of decaying will be acid and should be used only on acid loving plants.

—o—

COMPOSTING MANURE

Q. For some years I have put horse manure into sheds covered with a roof. The idea is to prevent the cutworms getting into it. I have had no trouble with the cutworms but the horse manure does not break down. It simply burns a little and then stays dry for years without becoming what I judge you call compost.

N. B. C., San Miguel A.,
Huehuetenango, Guatemala, C. A.

A. Apparently, you have made all the mistakes it is possible to make in

manufacturing compost. In the first place you have not applied water. Without moisture the bacteria cannot do their part in breaking down the manure. Rotting is purely a biological process accomplished by micro-organisms and you must make the conditions right for them. The burning that you mention is called fire-fanging and destroys a great part of the fertilizer value of the horse manure. This type of manure is more prone to fire-fanging than either cow, pig or chicken manures. If you would make good compost out of your horse-manure by layering it with green matter, you would not need to worry about cutworm. They rarely attack plants that are grown with well-made compost.

—o—

WEEDS IN COMPOSTED PLANTS

Q. I must be doing something wrong as I have so many weeds growing among my composted plants. Can you help me?

Mrs. W. G. S., Staten Island, N. Y.

A. In order to be certain that weed seeds are killed two precautions can be taken. First when the two turns of the heap are made one must see that what has been on the outside of the heap, gets into the center of it where the heat is sufficiently high to kill the seeds. If this is done twice, then all the material will have a chance at some time or other to be in the center. Secondly, where the material is not turned, earthworms should be used for that purpose. They chew up the material. After a weed seed has passed through the digestive system of a worm it has lost all ability to grow.

The ideal method would be to combine one and two, that is, make the two turns and use earthworms. On our farm where we have been applying compost for six years, the weed problem is getting less and less serious each year.

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•

ORGANIC GARDENING

EMMAUS, PA.

SOURCES OF POTASH

Q. Phosphate rock may be purchased, but how may potash be procured aside from wood ashes?

A. E. W., Maplewood, N. J.

A. Potash in ample amounts may be had from the following sources: woodashes 10%; bloodmeal 0.7%; duck manure 0.63%; flyash 12%; goose manure 0.55%; vegetable wastes 1.4%; hen manure 0.85%; potato tops 0.8%; molasses wastes 10.5%; sea ooze 0.92%; pulverized basalt 1.51%; winter rye 1.0%; pigeon dung 1.0%; apple pomace 0.24%; pine needles 0.13%; weeds 0.7%. These and many other plant and animal residues have ample supplies of potash for growing plants.

—o—

IRON RUST IN COMPOST

Q. Can you tell me whether there is any advantage in putting large amounts of iron rust in compost or in the soil where vegetables and fruits are grown?

W. R. A., Pasadena, Calif.

A. Plants use only traces of iron which serves as a catalyst in the manufacture of the green pigment, chlorophyll. Large amounts of iron are not necessary in the compost or in the soil.

—o—

MOSAIC PEACHES

Q. Peaches which are grown in Grand Valley, Colorado, are said to have the highest sugar content of peaches in the whole world. Some of our trees develop a mosaic, a condition in which the leaves have lighter colored spots and the fruits become small and bitter. This mosaic condition is

said by some to be a disease, but they are not sure. It has caused severe losses in some orchards. What is your opinion of the nature and cause of peach mosaic?

Mr. J. C., Palisade, Colorado.

A. The peach mosaic in your region is doubtless caused by a deficiency of some necessary element in the soil. This deficiency is probably caused by the alkalinity of the soil. The elements which are not available to the peach trees are perhaps locked up by the soil alkalies.

—o—

TRANSPLANTING MAGNOLIAS

Q. What is the best time of the year for transplanting magnolias?

R. E., Johnstown, Pa.

A. Magnolias can be transplanted most successfully during their early blooming period, for the roots are then active and will heal over and not die back.

—o—

CONTROL OF WILD MORNING GLORIES

Q. How can wild morning glories be controlled?

J. A. O., Gleens Ferry, Idaho.

A. There is no simple inexpensive method of killing wild morning glory.

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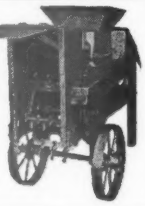

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—o—

CONTROL OF ORCHARD INSECTS

Q. How can we avoid spraying our 60 apple and pear trees? We do not want to spray on account of the chickens, goats, and sheep which roam the orchard.

E. H. S., Weatogue, Conn.

A. We have demonstrated on our organic farm that apple trees can be made relatively free from diseases and insect pests so far as the vegetative parts of the tree are concerned. But some of the fruits, which are

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naturally high in carbohydrates, are attacked by insects. The insects which attack the fruits can be controlled reasonably well by constructing and maintaining bird houses in the orchard and avoid the use of all poisonous sprays which kill the birds as well as the insects. You can avoid spraying by composting and mulching your trees and at the same time protecting the birds which can and will keep the insects under control.

—o—

HYBRID EARTHWORMS

Q. Why do you not give more information about using hybrid earthworms for the compost piles?

W. E. B., Gold Hill, Oregon.

A. Zoologists have questioned the validity of the hybrid earthworm. They believe the hybrid earthworms of the late Dr. Oliver are manure worms which, however, do a good job in the compost pile. This will require further study.

—o—

FLAX WASTE

Q. I can get any amount of flax straw and the tailings after towing, and I wonder if these would make satisfactory mulching materials.

G. W., Lakefield, Minn.

A. Flax straw and the tailings after towing are excellent materials for mulching. A good mulch of these materials will help control weeds, conserve soil moisture and temperature, and protect and feed the soil organisms.

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by

J. I. RODALE

author of Pay Dirt

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Editor of Organic Gardening

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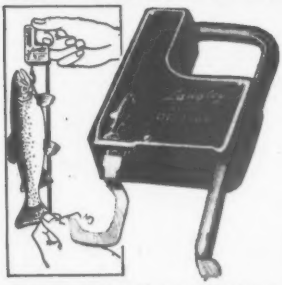

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